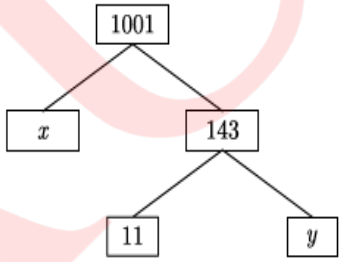
PAULS COACHING - GLOBAL

GRADE X
Question Bank (MATHEMATICS)
Chapter-1 Real Numbers

1 marks:

1. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$, where a and b are prime numbers then $LCM(a, b) =$ **[BOARD 2024]**
   a) ab b) a^2b^2 c) a^3b^2 d) a^3b^3
2. If p and q are natural numbers and 'p' is the multiple of 'q', then what is the HCF of 'p' and 'q'? **[BOARD 2023]**
   a) pq b) p c) q d) $p + q$
3. Let a and b be two positive integers such that $a = p^3q^4$ and $b = p^2q^3$, where p and q are prime numbers. If $HCF(a, b) = p^mq^n$ and $LCM(a, b) = p^rq^s$, then $(m + n)(r + s) =$
   a) 15 b) 30 c) 35 d) 72
4. The sum of exponents of prime factors in the prime factorization of 196 is
   a) 3 b) 4 c) 5 d) 2
5. The sum of exponents of prime factors in the prime factorization of 1764 is
   a) 3 b) 4 c) 5 d) 6
6. The values of x and y in the given figure are



   a) 7, 13 b) 13, 7 c) 9, 12 d) 12, 9
7. The total number of factors of prime number is
   a) 1 b) 0 c) 2 d) 3
8. The HCF and LCM of 12, 21, 15 respectively are
   a) 3, 140 b) 12, 420 c) 3, 420 d) 420, 3
9. The HCF and LCM of 378, 180, 420 are **[BOARD 2024]**
   a) 6, 3980 b) 12, 3780 c) 6, 3780 d) 12, 3980
10. If the product of two co-prime numbers is 553, then their HCF is **[BOARD 2024]**
    a) 1 b) 553 c) 7 d) 79
11. The LCM of smallest two digit composite number and smallest composite number is
    a) 12 b) 4 c) 20 d) 44

12. The ratio of LCM and HCF of the least composite and the least prime numbers is **[BOARD 2023]**

a) 1: 2 b) 2: 1 c) 1: 1 d) 1: 3

13. If $HCF(336, 54) = 6, LCM(336, 54)$ is

a) 2024 b) 3024 c) 1012 d) 1512

14. The value of 'a', if $HCF(x, 18) = 2$ *and* $LCM(x, 18) = 36$, is

a) 2 b) 5 c) 7 d) 4

15. HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54 then the other number is

a) 36 b) 35 c) 9 d) 81

16. The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280 then the other number is

a) 20 b) 28 c) 60 d) 80

17. HCF of 144 and 198 is

a) 9 b) 18 c) 6 d) 12

18. 225 can be expressed as

a) 5×3^2 b) $5^2 \times 3$ c) $5^2 \times 3^2$ d) $5^3 \times 3$

19. 108 can be expressed as a product of its prime as

a) $2^3 \times 3^2$ b) $2^3 \times 3^3$ c) $2^2 \times 3^2$ d) $2^2 \times 3^3$

20. When 2120 is expressed as the product of its prime factors we get

a) $2 \times 5^3 \times 53$ b) $2^3 \times 5 \times 53$ c) $5 \times 7^2 \times 31$ d) $5^2 \times 7 \times 33$

21. $2\sqrt{3}$ is _____ number.

a) Integer b) rational c) irrational d) whole

22. If a and b are two positive integers such that the least prime factor of a is 3 and the least prime factor of b is 5. Then the least prime factor of $(a + b)$ is

a) 1 b) 2 c) 3 d) 4

23. Select the least number that is divisible by all numbers between 1 and 10 (both inclusive)

a) 2520 b) 5040 c) 1010 d) 2020

24. If 'n' is a natural number then which of the following numbers end with zero? **[BOARD 2023]**

a) $(3 \times 2)^n$ b) $(2 \times 5)^n$ c) $(6 \times 2)^n$ d) $(5 \times 3)^n$

25. If $p^2 = \frac{32}{50}$ then p is_____ number. **[BOARD 2023]**

a) Whole b) integer c) rational d) irrational

26. If the $HCF(2520, 6600) = 40$ and $LCM(2520, 6600) = 252 \times k$ then the value of k is **[BOARD 2024]**

a) 1650 b) 1600 c) 165 d) 1625

27. If $a = 2^2 \times 3^x, b = 2^2 \times 3 \times 5, c = 2^2 \times 3 \times 7$ and $LCM(a, b, c) = 3780$ then x is **[BOARD 2024]**

a) 1 b) 2 c) 3 d) 0

28. If $3825 = 3^x \times 5^y \times 17^z$ then the value of $x + y - 2z$ is **[BOARD 2024]**

a) 0 b) 1 c) 2 d) 3

29. A pair of irrational numbers whose product is a rational number is **[BOARD 2024]**

a) $(\sqrt{16}, \sqrt{4})$ b) $(\sqrt{5}, \sqrt{2})$ c) $(\sqrt{3}, \sqrt{27})$ d) $(\sqrt{36}, \sqrt{2})$

30. The smallest irrational number by which $\sqrt{20}$ should be multiplied so as to get a rational number, is **[BOARD 2024]**

a) $\sqrt{20}$ b) $\sqrt{2}$ c) 5 d) $\sqrt{5}$

31. The greatest number which divides 281 and 1249, leaving remainder 5 and 7 respectively, is **[BOARD 2024]**

a) 23 b) 276 c) 138 d) 69

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)
b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)
c) Assertion (A) is true but reason (R) is false
d) Assertion (A) is false but reason (R) is true

32. ***Assertion (A):*** If HCF of 510 and 92 is 2 then their LCM is 32460.
Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

33. ***Assertion (A):*** If the product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
Reason (R): HCF is always factor of LCM.

34. ***Assertion (A):*** If $HCF(90, 144) = 18, LCM(90, 144) = 720$
Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

35. ***Assertion (A):*** The HCF of two numbers is 5 and their product is 150 then their LCM is 30.
Reason (R): $HCF(a, b) + LCM(a, b) = a \times b$

36. ***Assertion (A):*** The HCF of two numbers is 9 and their LCM is 2016. If one number is 54 then the other number is 336.
Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

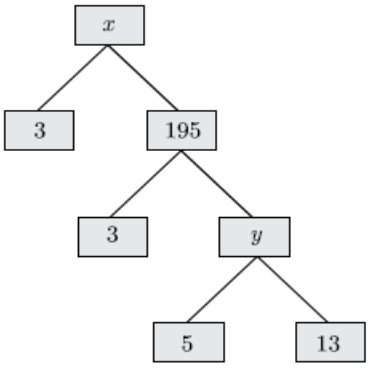
37. ***Assertion (A):*** The number 6^n never end with digit 0 for any natural number n.
Reason (R): The number 9^n never end with digit 0 for any natural number n.

38. ***Assertion (A):*** The number 5^n never ends with digit 0 for any natural number n.
Reason (R): Prime factorisation of 5 has only two factors, 1 and 5. **[BOARD 2023]**

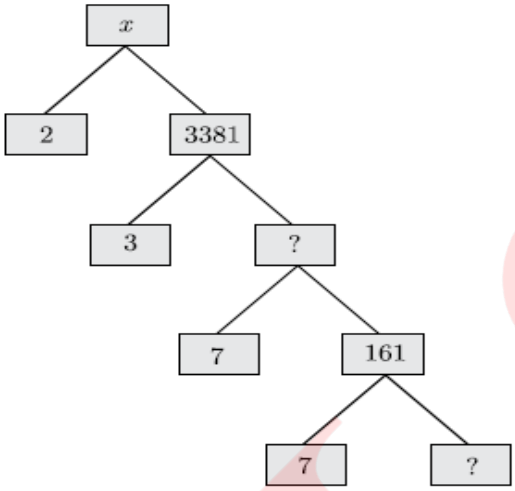
39. ***Assertion (A):*** The largest number that divides 70 and 125 which leaves remainder 5 and 8 is 13.
Reason (R): $HCF(65, 117) = 13$

2 marks:

1. Explain why $(7 \times 13 \times 11) + 11$ and $(7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1) + 3$ are composite numbers. **[BOARD 2024]**
2. Explain whether $(3 \times 12 \times 101) + 4$ is a prime number or a composite number.
3. Given that $HCF(306, 1314) = 18$. Find $LCM(306, 1314)$.
4. Check whether 4^n can end with the digit 0 for any natural number n. **[BOARD 2023 & BOARD 2024]**
5. Show that $5\sqrt{6}$ is an irrational number.
6. If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$ where a and b are prime numbers then verify $LCM(p, q) \times HCF(p, q) = pq$.
7. Prove that $3 + \sqrt{5}$ is an irrational number. **[BOARD 2023]**
8. Prove that $6 - \sqrt{7}$ is an irrational number. **[BOARD 2023]**
9. Two numbers are in the ratio 2:3 and their LCM is 180. What is the HCF of these numbers? **[BOARD 2023]**
10. Using prime factorization find HCF and LCM of 96 and 120. **[BOARD 2023]**
11. Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively. **[BOARD 2023]**
12. Find the greatest 3-digit number which is divisible by 18, 24 and 36. **[BOARD 2023]**
13. Find the least number which when divided by 12, 16 and 24 leaves remainder 7 in each case. **[BOARD 2023]**
14. Find the smallest natural number by which 1200 should be multiplied so that the square root of the product is a rational number.
15. In a school, there are two sections of class X. There are 40 students in the first section and 48 students in the second section. Determine the minimum number of books required for their class library so that they can be distributed equally among students of both sections. **[BOARD 2024]**
16. Complete the following factor tree and find the composite number x.



17. Complete the following factor tree and find the composite number x.



3 marks:

1. Prove that $\sqrt{5}$ is an irrational number. **[BOARD 2023]**
2. Given that $\sqrt{3}$ is an irrational, prove that $5 + 2\sqrt{3}$ is an irrational number. **[BOARD 2024]**
3. Given that $\sqrt{5}$ is an irrational, prove that $2\sqrt{5} - 3$ is an irrational number.
4. Given that $\sqrt{3}$ is an irrational, prove that $\frac{2-\sqrt{3}}{5}$ is an irrational number. **[BOARD 2024]**
5. Given that $\sqrt{2}$ is an irrational, prove that $5 + 3\sqrt{2}$ is an irrational number.
6. Prove that $(\sqrt{2} + \sqrt{3})^2$ is irrational number, given that $\sqrt{6}$ is an irrational number. **[BOARD 2024]**
7. Write the smallest number which is divisible by both 306 and 657.
8. Find HCF and LCM of 16 and 36 by prime factorization and check your answer.
9. Find HCF and LCM of 26, 65 and 117 using prime factorization. **[BOARD 2023]**
10. Find HCF and LCM of 378, 180 and 420 by prime factorization. Verify that $HCF \times LCM$ = product of two numbers.
11. Find by prime factorization the LCM of the numbers 18180 and 7575. Also find the HCF of two numbers. **[BOARD 2023]**
12. 144 cartons of Coke cans and 90 cartons of Pepsi cans are to be stacked in a canteen. If each stack is of the same height and if it equal contain cartons of the same drink, what would be the greatest number of cartons each stack would have?
13. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together? **[BOARD 2024]**
14. Three bells ring at intervals of 6, 12 and 18 minutes. If all the three bells rang at 6 a.m., when will they ring together again? **[BOARD 2023]**
15. Four bells toll at an interval of 8, 12, 15 and 18 seconds respectively. All the four begin to toll together. Find the number of times they toll together in one hour excluding the one at the start.

16. The length, breadth and height of a room are 8m 50cm, 6m 25cm and 4m 75cm respectively. Find the length of the longest rod that can measure the dimensions of the room exactly.
17. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm respectively. Find the minimum distance each should walk so that each can cover the same distance in complete steps.
18. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m, at what time will they change together next? **[BOARD 2023]**
19. National Art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same artform and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room?
20. In a teacher's workshop the number of teacher teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same numbers of teachers are seated and all of them are of same subject. **[BOARD 2024]**

Case Based Questions:

1. February 14 is celebrated as International Book Giving Day and many countries in the world celebrate this day. Some people in India also started celebrating this day and donated the following number of books of various subjects to a public library: History = 96, Science = 240, Mathematics = 336.

   These books have to be arranged in minimum number of stacks such that each stack contains books of only one subject and the number of books on each stack is the same. **[BOARD 2023]**

   Based on the above information, answer the following questions:

   (i) How many books are arranged in each stack? **1**

   (ii) How many stacks are used to arrange all the Mathematics books? **1**

   (iii) (a) Determine the total number of stacks that will be used for arranging all the books. **2**

   OR

   (b) If the thickness of each book of History, Science and Mathematics is 1·8 cm, 2·2 cm and 2·5 cm respectively, then find the height of each stack of History, Science and Mathematics books. **2**

2. Three sets of English, Hindi and Mathematics books have to be stacked in such a way that all the books are stored topic wise and the height of each stack is the same. The number of English books is 96, the number of Hindi books is 240 and the number of Mathematics books is 336. Assuming that the books are of the same thickness.

(i) Find the number of stacks of Hindi books? **1**

(ii) Find the number of stacks of English books? **2**

OR

Find the number of stacks of Mathematics books? **2**

(iii) What is the number of books that can be stored in each stack? **1**

3. Teaching Mathematics through activities is a powerful approach that enhances students' understanding and engagement. Keeping this in mind, Ms. Muktha planned a prime number game for class 5 students. She announces the number 2in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way by multiplying to a prime number, the last student got 173250. **[BOARD 2024]**

Now, Muktha asked some questions as given below to the students:

(i) What is the least prime number used by students? **1**

(ii) How many students are in the class? **2**

OR

What is the highest prime number used by students? **2**

(iii) Which prime number has been used maximum times? **1**

GRADE X
Question Bank (MATHEMATICS)
Chapter-2 Polynomials

1 marks:

1. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2 then the value of k is **[BOARD 2023]**

   a) 10 b) -10 c) 5 d) -5

2. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2 then the value of k is

   a) 5/6 b) -5/6 c) 6/5 d) -6/5

3. If one zero of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3 then the value of k is

   a) 4/3 b) -4/3 c) 2/3 d) -2/3

4. If -1 is a zero of the polynomial $kx^2 - 4x + k$, the value of k is

   a) -4 b) -2 c) 2 d) 4

5. If -1 is a zero of the polynomial $x^2 - 7x - 8$ then other zero is,

   a) 4 b) 8 c) 1 d) -4

6. If one zero of the polynomial $3x^2 + 8x + k$ is the reciprocal of the other, then value of k is

   a) 3 b) -3 c) 1/3 d) -1/3

7. If one zero of the polynomial $6x^2 + 37x - (k-2)$ is the reciprocal of the other, then value of k is **[BOARD 2023]**

   a) -4 b) -6 c) 4 d) 6

8. If one zero of the polynomial $x^2 - 3kx + 4k$ be twice the other, then the value of k is **[BOARD 2023]**

   a) -2 b) 2 c) $\frac{1}{2}$ d) $-\frac{1}{2}$

9. If sum of the zeros of the quadratic polynomial $2x^2 - k\sqrt{2}x + 1$ is $\sqrt{2}$ then the value of k is **[BOARD 2024]**

   a) $\sqrt{2}$ b) 2 c) $2\sqrt{2}$ d) $\frac{1}{2}$

10. The sum of zeros of the polynomial $\sqrt{2}x^2 - 17$ are **[BOARD 2023]**

    a) $\frac{17\sqrt{2}}{2}$ b) $-\frac{17\sqrt{2}}{2}$ c) 0 d) 1

11. If the zeros of the quadratic polynomial $x^2 + (a+1)x + b$ are 2 and -3 then

    a) $a = -7, b = -1$ b) $a = 5, b = -1$ c) $a = 2, b = -6$ d) $a = 0, b = -6$

12. If α *and* β are the zeros of a polynomial $x^2 - 1$ then the value of $\alpha + \beta$ is **[BOARD 2023]**

a) 2 b) 1 c) -1 d) 0

13. If α *and* β $(\alpha > \beta)$ are the zeros of a polynomial $-x^2 + 8x + 9$ then $(\alpha - \beta)$ is **[BOARD 2024]**

a) -10 b) 10 c) ± 10 d) 8

14. If α *and* β are the zeros of a polynomial $px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$ then p is **[BOARD 2024]**

a) -2/3 b) 2/3 c) 1/3 d) -1/3

15. If α *and* β are the zeros of a polynomial $ax^2 - 5x + c$ and $\alpha + \beta = \alpha\beta = 10$ then **[BOARD 2023]**

a) $a = 5, c = \frac{1}{2}$ b) $a = 1, c = \frac{5}{2}$ c) $a = \frac{5}{2}, c = 1$ d) $a = \frac{1}{2}, c = 5$

16. If α *and* β are the zeros of a polynomial $x^2 - 4\sqrt{3}x + 3$ then the value of $\alpha + \beta - \alpha\beta$ is

a) $\sqrt{3}(2 - \sqrt{3})$ b) $\sqrt{3}(2 + \sqrt{3})$ c) $\sqrt{3}(4 + \sqrt{3})$ d) $\sqrt{3}(4 - \sqrt{3})$

17. If α *and* β are the zeros of a polynomial $x^2 + 2x + 1$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is **[BOARD 2023]**

a) -2 b) 2 c) 0 d) 1

18. If α *and* β are the zeros of a polynomial $4x^2 - 3x - 7$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is **[BOARD 2024]**

a) $\frac{7}{3}$ b) $-\frac{7}{3}$ c) $\frac{3}{7}$ d) $-\frac{3}{7}$

19. If α *and* β are the zeros of a polynomial $2x^2 - 13x + 6$, then $\alpha + \beta$ is

a) -3 b) 3 c) 13/2 d) -13/2

20. If α *and* β are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $(\alpha - \beta)^2$ is

a) 2 b) 1 c) -1 d) -6

21. If α *and* β are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $\alpha^2 + \beta^2$ is **[BOARD 2023 & BOARD 2024]**

a) -7 b) 1 c) -1 d) -6

22. If α *and* β are the zeros of a polynomial $x^2 - ax - b$ then the value of $\alpha^2 + \beta^2$ is **[BOARD 2023]**

a) $a^2 - 2b$ b) $a^2 + 2b$ c) $b^2 - 2a$ d) $b^2 + 2a$

23. If α *and* β are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is

a) $\frac{4}{25}$ b) $-\frac{4}{25}$ c) $\frac{4}{5}$ d) $-\frac{4}{5}$

24. If α *and* β are the zeros of a polynomial $x^2 - x - 4$ then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is

a) 15/4 b) -15/4 c) 4 d) 15

25. If p *and* q are the zeros of a polynomial $2x^2 - 7x + 3$ the value of $p^2 + q^2$ will be

a) $\frac{39}{5}$ b) $\frac{5}{39}$ c) $\frac{37}{4}$ d) $\frac{4}{37}$

26. If p *and* q are the zeros of a polynomial $2x^2 - 7x + 3$ the value of $p + q - pq$ will be

a) 1 b) 2 c) 3 d) 4

27. If m *and* n are the zeros of a polynomial $3x^2 + 11x - 4$ then the value of $\frac{m}{n} + \frac{n}{m}$ will be

a) $\frac{12}{145}$ b) $-\frac{12}{145}$ c) $-\frac{145}{12}$ d) $\frac{145}{12}$

28. If a and b are the zeros of a polynomial $x^2 + ax + b$, the value of a and b are

a) 1 and 2 b) 1 and -2 c) -2 and 1 d) 2 and 1

29. If the sum of the zeros of the quadratic polynomial $kx^2 + 2x + 3k$ is equal to their product then k

a) 1/3 b) -1/3 c) 2/3 d) -2/3

30. The sum and product of zeros of a quadratic polynomial are $2\sqrt{3}$ and 3 respectively, the quadratic polynomial will be **[BOARD 2024]**

a) $x^2 + 2\sqrt{3}x - 3$ b) $\left(x - \sqrt{3}\right)^2$ c) $x^2 - 2\sqrt{3}x - 3$ d) $x^2 + 2\sqrt{3}x + 3$

31. The quadratic polynomial, the sum of whose zeros is -5 and their product is 6, is

a) $x^2 + 5x + 6$ b) $x^2 - 5x + 6$ c) $x^2 - 5x - 6$ d) $-x^2 + 5x + 6$

32. The quadratic polynomial p(x) with 3 and $-\frac{2}{5}$ as sum and product of its zeros

a) $x^2 - 3x - \frac{2}{5}$ b) $x^2 - 3x - 2$ c) $5x^2 - 15x - 2$ d) $15x^2 - 5x + \frac{2}{5}$

33. The sum and product of the zeros of a quadratic polynomial are 3 and -10 respectively. The quadratic polynomial is

a) $x^2 - 3x + 10$ b) $x^2 + 3x - 10$ c) $x^2 - 3x - 10$ d) $x^2 + 3x + 10$

34. The quadratic polynomial whose sum and product of the zeros are $\frac{21}{8}$ *and* $\frac{5}{16}$, is

a) $16x^2 - 42x + 5$ b) $\frac{1}{16}(16x^2 - 42x + 5)$ c) $\frac{1}{12}(16x^2 + 42x + 5)$ d) $\frac{1}{12}(16x^2 + 42x - 5)$

35. A quadratic polynomial whose zeros are -3 and 4, is

a) $x^2 - 2x + 12$ b) $x^2 + x + 12$ c) $\frac{x^2}{2} - \frac{x}{2} - 6$ d) $2x^2 + 2x - 24$

36. The maximum number of zeros a cubic polynomial can have, is

a) 1 b) 2 c) 3 d) 4

37. Which of the following is a quadratic polynomial having zeros $-\frac{2}{3}$ *and* $\frac{2}{3}$. **[BOARD 2023]**

a) $4x^2 - 9$ b) $\frac{4}{9}(9x^2 + 4)$ c) $x^2 + \frac{9}{4}$ d) $5(9x^2 - 4)$

38. Write a quadratic polynomial whose sum of zeros is $-\frac{1}{4}$ and product of zeros is $\frac{1}{4}$

a) $4x^2 + x + 1$ b) $x^2 + 4x - 1$ c) $2x^2 + 3x - 1$ d) $x^2 - 2x + 1$

39. The quadratic polynomial whose zeros are reciprocals of the zeros of the polynomial $ax^2 + bx + c, a \neq 0, c \neq 0$

a) $bx^2 + ax + c$ b) $ax^2 + cx + b$ c) $cx^2 + bx + a$ d) $bx^2 + cx + a$

40. The zeros of the polynomial $x^2 - 2x$ are

a) 2, 4 b) 1, 3 c) 0, 2 d) 0, 4

41. The zeros of the polynomial $x^2 - 3x - m(m + 3)$ are

a) $m, m + 3$ b) $-m, m + 3$ c) $m, -(m + 3)$ d) $-m, -(m + 3)$

42. The zeros of the polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$ are **[BOARD 2023]**

a) $2\sqrt{3}, \sqrt{3}$ b) $2\sqrt{3}, \frac{1}{\sqrt{3}}$ c) $\frac{1}{\sqrt{3}}, \sqrt{3}$ d) $\frac{2}{\sqrt{3}}, 2\sqrt{3}$

43. The zeros of the polynomial $4x^2 - 12x + 9$ will be **[BOARD 2023 & BOARD 2024]**

a) $\frac{3}{2}, \frac{3}{2}$ b) $\frac{2}{3}, \frac{1}{3}$ c) $\frac{3}{2}, \frac{1}{3}$ d) $\frac{1}{3}, \frac{1}{3}$

44. The zeros of polynomial $ax^2 + bx + c$ are reciprocal of each other if

a) $b = 2a$ b) $c = b$ c) $b = a$ d) $c = a$

45. If zeros of the polynomial $x^2 + 4x + 2a$ are a *and* $\frac{2}{a}$ then the value of a is

a) 1 b) 2 c) 3 d) 4

46. If the zeros of the polynomial $x^2 + (a + 1)x + b$ are 2 and -3 then **[BOARD 2023]**

a) $a = -7, b = -1$ b) $a = 5, b = -1$ c) $a = 2, b = -6$ d) $a = 0, b = -6$

47. The zeros of the polynomial $x^2 + px + q$ are twice the zeros of the polynomial $4x^2 - 5x - 6$. The value of p is **[BOARD 2024]**

a) $\frac{-5}{2}$ b) $\frac{5}{2}$ c) -5 d) 10

48. If the square of difference of the zeros of the quadratic polynomial $x^2 + px + 45$ is equal to 144 then the value of p is

a) ± 9 b) ± 12 c) ± 15 d) ± 18

49. The number of polynomials having zeros as -3 and 5 is **[BOARD 2023]**

a) 1 b) 2 c) 3 d) more than 3

50. What should be the subtracted from the polynomial $x^2 - 16x + 30$ so that 15 is the zero of the resulting polynomial? **[BOARD 2024]**

a) 30 b) 14 c) 15 d) 16

51. What should be the added from the polynomial $x^2 - 5x + 4$ so that 3 is the zero of the resulting polynomial? **[BOARD 2024]**

b) 1 b) 2 c) 4 d) 5

52. If a polynomial p(x) is given by $p(x) = x^2 - 5x + 6$ then the value of $p(1) + p(4)$ is **[BOARD 2024]**

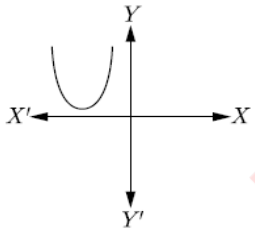
a) 0 b) 4 c) 2 d) -4

53. A quadratic polynomial, one of whose zeros is $2 + \sqrt{5}$ and the sum of whose zeros is 4, is **[BOARD 2024]**

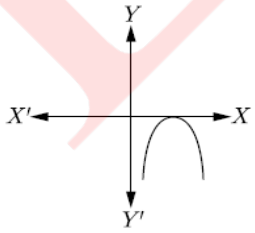
a) $x^2 + 4x - 1$ b) $x^2 - 4x - 1$ c) $x^2 - 4x + 1$ d) $x^2 + 4x + 1$

54. Which of the following is not the graph of a quadratic polynomial?

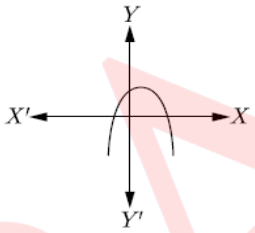
(a)



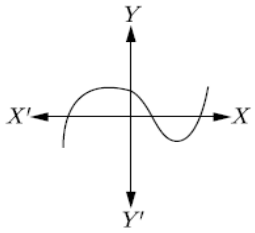
(b)



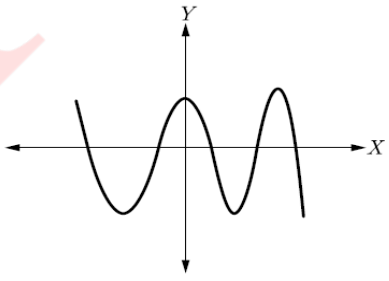
(c)



(d)



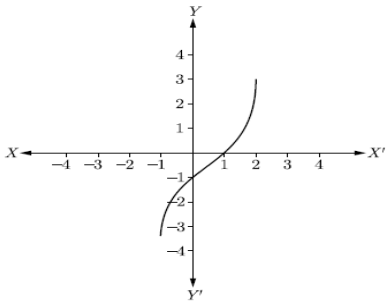
55. The graph of $y = p(x)$ where $p(x)$ is a polynomial in variable x, is as follows:



The number of zeros of p(x) is

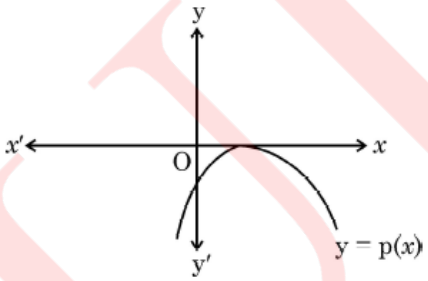
a) 2 b) 3 c) 4 d) 5

56. In the given figure, the graph of a polynomial p(x) is shown. The number of zeros of p(x) will be



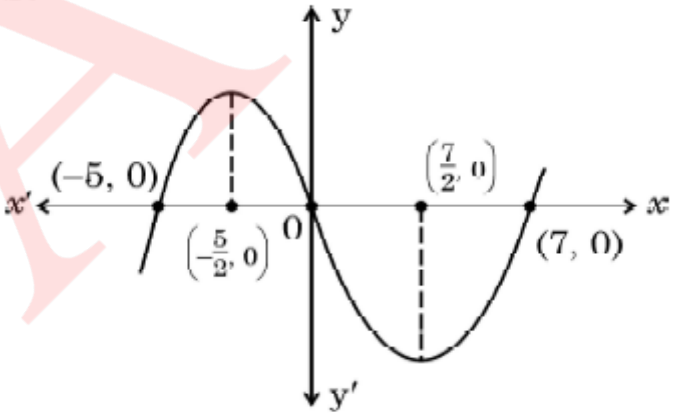
a) 1 b) 2 c) 3 d) 4

57. The graph of $y = p(x)$ is given for a polynomial $p(x)$. The number of zeros of $p(x)$ from the graph is **[BOARD 2023]**



a) 0 b) 1 c) 2 d) 3

58. The graph of $y = p(x)$ is given for a polynomial $p(x)$. The number of zeros of $p(x)$ from the graph are **[BOARD 2023]**



a) -5, 7 b) $-\frac{5}{2}, -\frac{7}{2}$ c) -5, 0, 7 d) $-5, -\frac{5}{2}, \frac{7}{2}, 7$

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

59. ***Assertion (A):*** If one zero of the polynomial $(k^2+4)x^2+13x+4k$ is reciprocal of other then $k=2$.

Reason (R): If $(x-\alpha)$ is a factor of $p(x)$ then $p(\alpha)=0$.

60. ***Assertion (A):*** The polynomial $p(x)=x^2+3x+3$ has two real zeros.

Reason (R): A quadratic polynomial can have at most two real zeros.

[BOARD 2023]

61. ***Assertion (A):*** If the graph of a polynomial touches x-axis at only one point then the polynomial cannot be a quadratic polynomial. **[BOARD 2024]**

Reason (R): A polynomial of degree n $(n>1)$ can have at most n zeros.

62. ***Assertion (A):*** Degree of zero polynomial is not defined.

Reason (R): Degree of a non-zero constant polynomial is 0. **[BOARD 2024]**

2 marks:

1. Find the zeros of the quadratic polynomial $\sqrt{3}x^2-8x+4\sqrt{3}$.
2. Find a quadratic polynomial the sum and product of whose zeros are 6 and 9 respectively. Hence find the zeros.
3. Find a quadratic polynomial the sum and product of whose zeros are -3 and 2 respectively. Hence find the zeros.
4. Form a quadratic polynomial p(x) with 3 and $-\frac{2}{5}$ as sum and product of its zeros respectively.
5. If α *and* β are the zeros of the polynomial $5x^2-7x+1$ then find the value of $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$.
6. If α *and* β are the zeros of the polynomial $x^2-4\sqrt{3}x+3$, then find the value of $\alpha+\beta-\alpha\beta$. **[BOARD 2024]**
7. If α *and* β are the zeros of the polynomial $x^2-(k-6)x+2(2k-1)$ find the value of k if $\alpha+\beta=\frac{1}{2}\alpha\beta$
8. If one of the zeros of the quadratic polynomial $14x^2-42k^2x-9$ is negative of the other, find the value of 'k'.
9. If one zero of the polynomial $2x^2+3x+\lambda$ is $\frac{1}{2}$ find the value of λ and the other zero.

10. Find the value of k such that the polynomial $x^2 - (k+6)x + 2(2k+1)$ has sum of its zeros equal to half of their product.

3 marks:

1. Find the zeros of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between zeros and coefficients.
2. Find the zeros of the quadratic polynomial $x^2 + \frac{1}{6}x - 2$ and verify the relationship between zeros and coefficients.
3. Find the zeros of the quadratic polynomial $x^2 - 15$ and verify the relationship between zeros and coefficients. **[BOARD 2024]**
4. Find the zeros of the quadratic polynomial $2x^2 - x - 6$ and verify the relationship between zeros and coefficients. **[BOARD 2024]**
5. If the zeros of the polynomial $x^2 + px + q$ are double in value to the zeros of the polynomial $2x^2 - 5x - 3$ then find the values of p and q.
6. If a, b are the zeros of the polynomial $2x^2 - 5x + 7$ then find a polynomial whose zeros are $2a + 3b$ *and* $3a + 2b$.
7. Find a quadratic polynomial whose zeros are reciprocals of the zeros of the polynomial $ax^2 + bx + c, a \neq 0, c \neq 0$.
8. Find the quadratic polynomial sum and product of whose zeros are -1 and -20 respectively. Also find the zeros of the polynomial so obtained.
9. Verify whether 2, 3 and $1/2$ are the zeros of the polynomial $2x^3 - 11x^2 + 17x - 6$.
10. If the sum and product of the zeroes of the polynomial $ax^2 - 5x + c$ are equal to 10 each, find the value of 'a' and 'c'.
11. If one zero of the polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k.
12. If α *and* β are the zeros of a polynomial $2x^2 - 3x + 1$ then find the quadratic polynomial whose zeros are 3α *and* 3β.
13. If α *and* β are the zeros of a polynomial $x^2 - 4x - 5$ the find the value of $\alpha^2 + \beta^2$.
14. If α *and* β are the zeros of a polynomial $x^2 + x - 2$ then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

[BOARD 2024]

15. What number should be added to the polynomial $x^2 - 5x + 4$ so that 3 is the zero of the polynomial?

5 marks:

1. If α *and* β are the zeros of a polynomial $3x^2 + 2x + 1$ find the polynomial whose zeroes are $\frac{1-\alpha}{1+\alpha}$ and $\frac{1-\beta}{1+\beta}$.
2. If α *and* β are the zeros of a polynomial $2x^2 + 5x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$ then find the value of k.
3. If α *and* β are the zeros of a polynomial $6x^2 - 5x + k$ such that $\alpha - \beta = \frac{1}{6}$ then find the value of k.
4. If β *and* $\frac{1}{\beta}$ are zeros of the polynomial $(a^2 + a)x^2 + 61x + 6a$ find the value of α *and* β.
5. Find the zeros of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeros and the coefficients.
6. If α *and* β are the zeros of a polynomial $2x^2 - 4x + 5$, find the values of
   (i) $\alpha^2 + \beta^2$
   (ii) $\frac{1}{\alpha} + \frac{1}{\beta}$
   (iii) $(\alpha - \beta)^2$
   (iv) $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$
   (v) $\alpha^3 + \beta^3$

Case Based Questions:

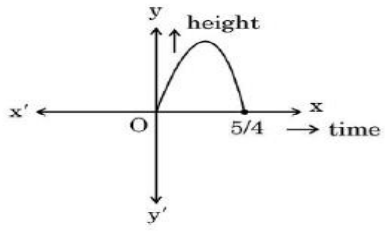
1. In a pool at an aquarium, a dolphin jumps out of the water travelling at 20 cm per second. Its height above water level after t seconds is given by $h = 20t - 16t^2$.

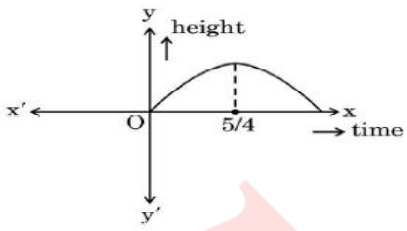
[BOARD 2023]

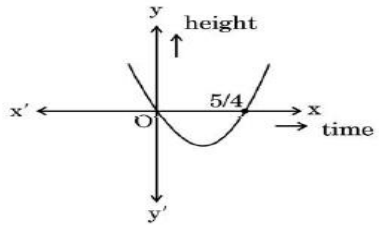
Based on the above, answer the following questions :

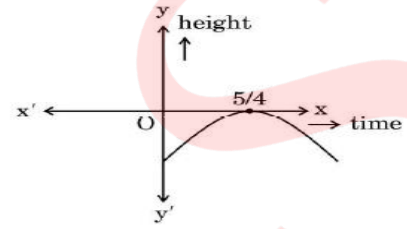
(i) Find zeroes of polynomial $p(t) = 20t - 16t^2$. **1**

(ii) Which of the following types of graph represents p(t)? **1**

(a) 

(b) 

(c) 

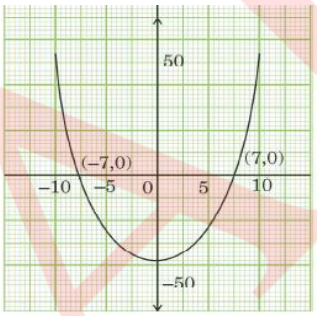
(d) 

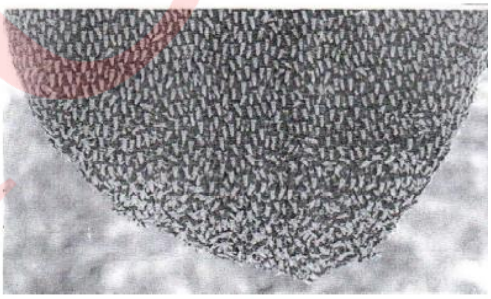
(iii) What would be the value of h at $t = \frac{3}{2}$? Interpret the result. **2**

OR

How much distance has the dolphin covered before hitting the water level again? **2**

2. While playing in a garden, Samaira saw a honeycomb and asked her mother what is that. Her mother replied that it's a honeycomb made by honey bees to store honey. Also, she told her that the shape of the honeycomb formed is mathematical structure. The mathematical representation of the honeycomb is shown in the graph. **[BOARD 2023]**





Based on the above information, answer the following questions:

(i) How many zeros are there for the polynomial represented by the graph given? **1**

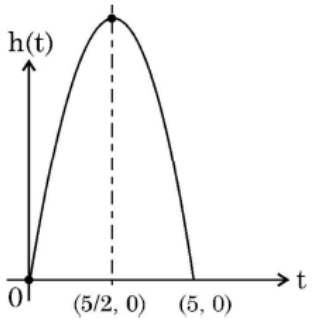
(ii) Write the zeros of the polynomial. **1**

(iii) If the zeros of the polynomial $x^2 + (a + 1)x + b$ are 2 and -3 then determine the values of a and b. **2**

OR

If the square of the difference of the zeros of the polynomial $x^2 + px + 45$ is 144 then find the values of p. **2**

3. A ball is thrown in the air so that t seconds after it is shown, its height h meter above its starting point is given by the polynomial $h = 25t - 5t^2$. **[BOARD 2024]**



Observe the graph of the polynomial and answer the following questions:

(i) Write zeros of the given polynomial. **1**

(ii) Find the maximum height achieved by the ball. **1**

(iii) After throwing upward, how much time did the ball take to reach to the height of 30 m? **2**

OR

Find two different values of t when the height of the ball was 20m. **2**

GRADE X

Question Bank (MATHEMATICS)

Chapter-3 Pair of linear equations in two variables

1 marks:

1. If the system of equations $3x + y = 1$ and $(2k-1)x + (k-1)y = 2k+1$ is inconsistent then k is
   a) -1 b) 0 c) 1 d) 2
2. The value of k for which the system of linear equations $x + 2y = 3,\ 5x + ky + 7 = 0$ is inconsistent, is
   a) $-14/3$ b) $2/5$ c) 5 d) 10
3. The value of k for which the system of equations $x + y - 4 = 0, 2x + ky = 3$ has no solution, is
   a) -2 b) $\neq 2$ c) 3 d) 2
4. For what value of k, the system of equations $kx + 3y = 1,\ 12x + ky = 2$ has no solution
   a) $k = -6$ b) $k \neq -6$ c) $k = 4$ d) $k = -4$
5. The value of c for which the pair of equations $cx - y = 2\ and\ 6x - 2y = 3$ will have no solution, is
   a) 3 b) -3 c) -12 d) 12
6. For what value of p the system of equations have no solution
   $(2p-1)x + (p-1)y = 2p+1, y + 3x - 1 = 0$
   a) $p = 2$ b) $p \neq 2$ c) $p = 4$ d) $p \neq 4$
7. For which value(s) of p, will the lines represented by the following pair of linear equations be parallel $3x - y - 5 = 0$ and $6x - 2y - p = 0$
   a) All real values except 10 c) 10
   b) $5/2$ d) $1/2$
8. If the lines given by $3x + 2ky = 2\ and\ 2x + 5y + 1 = 0$ are parallel then value of k is
   a) $-5/4$ b) $2/5$ c) $15/4$ d) $3/2$
9. The pair of equations $ax + 2y = 9\ \&\ 3x + by = 18$ represent parallel lines, where a, b are integers if **[BOARD 2023]**
   a) $a = b$ b) $3a = 2b$ c) $2a = 3b$ d) $ab = 6$
10. The pair of equations $2kx + 5y = 7, 6x - 5y = 11$ has a unique solution, if
    a) $k \neq -3$ b) $k \neq \frac{2}{3}$ c) $k \neq 5$ d) $k \neq \frac{2}{9}$
11. Which of the following value of k should be selected so that the pair of equations $x + 2y = 5$ and $3x + ky + 15 = 0$ has a unique solution?
    a) $k \neq 5$ b) $k \neq 6$ c) $k = 5$ d) $k = 6$

12. If the equations $kx - 2y = 3$ *and* $3x + y = 5$ represent two intersecting lines at unique point then the value of k is
    a) $k = -6$ b) $k \neq -6$ c) $k = 4$ d) $k \neq 4$

13. The value of k for which the pair of equations $kx - y = 2$ *and* $6x - 2y = 3$ has unique solution
    a) $k = 3$ b) $k \neq 3$ c) $k \neq 0$ d) $k = 0$

14. For what value of p does the pair of linear equations given below has unique solution $4x + py + 8 = 0$ *and* $2x + 2y + 2 = 0$
    a) $p = 1$ b) $p = 2$ c) $p \neq 4$ d) $p \neq 2$

15. The condition for the system of linear equations $ax + by = c$ & $lx + my = n$ to have a unique solution is **[BOARD 2023]**
    a) $am \neq bl$ b) $al \neq bm$ c) $al = bm$ d) $am = bl$

16. For what value of k, the equations $3x - y + 8 = 0, 6x - ky = -16$ represent coincident lines **[BOARD 2023]**
    a) $1/2$ b) $-1/2$ c) 2 d) -2

17. The value of k for which the pair of equations $kx = y + 2$ & $6x = 2y + 3$ has infinitely many solutions, is **[BOARD 2023]**
    a) $k = 3$ b) $k = -3$ c) $k = 4$ d) doesn't exist

18. For what value of k, the equations $kx + y = k^2$ *and* $x + ky = 1$ have infinitely many solutions. **[BOARD 2024]**
    a) 1 b) 2 c) 3 d) 4

19. The value of k for which the lines $5x + 7y = 3$ *and* $15x + 21y = k$ coincide is
    a) 9 b) 5 c) 7 d) 18

20. The value of k for which the lines represented by the following pair of linear equations are coincident is $2x + 3y + 7 = 0$ *and* $8x + 12y + k = 0$
    a) All real values except 14 c) 8
    b) 28 d) 14

21. For what value of k, the pair of linear equations $kx - 4y = 3, 6x - 12y = 9$ has an infinite number of solutions?
    a) $k = 2$ b) $k \neq 2$ c) $k \neq 3$ d) $k = 4$

22. One equation of a pair of dependent linear equation $-5x + 7y = 2$. The second equation can be
    a) $10x + 14y + 4 = 0$ c) $-10x - 14y + 4 = 0$
    b) $-10x + 14y + 4 = 0$ d) $10x - 14y + 4 = 0$

23. Two lines are given to be parallel. The equation of one of the lines is $4x + 3y = 14$ then the equation of the second line will be **[BOARD 2024]**
    a) $12x + 9y = 42$ c) $12x + 9y = 5$
    b) $12x + 8y = 15$ d) $12x + 8y = 42$

24. Given the linear equation $3x + 4y = 9$, select another linear equation in these two variables such that the geometrical representation of the pair so formed is intersecting lines
    a) $3x - 5y = 10$ c) $6x + 8y = 18$
    b) $8x + 12y = 18$ d) above all

25. If $3x + 4y : x + 2y = 9 : 4$ then $3x + 5y : 3x - y$ is
    a) $4 : 1$ b) $1 : 4$ c) $7 : 1$ d) $1 : 7$

26. If $x = a$ *and* $y = b$ is the solution of the equation $x - y = 2$ and $x + y = 4$ then the values of a and b are, respectively
    a) 3 and 5 b) 5 and 3 c) 3 and 1 d) -1 and -3

27. What are the values of x and y for the following pair of linear equations?
    $3x + 2y - 7 = 0$ *and* $4x + y - 6 = 0$
    a) 1 and 2 b) 2 and 2 c) 1 and 1 d) -1 and -1

28. What are the values of x and y for the following pair of linear equations?
    $2x - y = 2$ *and* $x + 3y = 15$
    a) 4 and 5 b) 3 and 4 c) 5 and 4 d) 4 and 4

29. The solution of the following pair of linear equations:
    $x - 3y = 2$ *and* $3x - y = 14$
    a) $x = 5, y = 1$ b) $x = 2, y = 3$ c) $x = 1, y = 2$ d) $x = 1, y = 4$

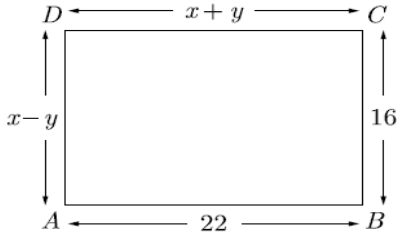
30. The solutions of the pair of equations $x + y = a + b$ & $ax - by = a^2 - b^2$ is **[BOARD 2023]**
    a) $x = b,\ y = a$ b) $x = -a, y = b$ c) $x = a, y = b$ d) $x = a, y = -b$

31. If $ax + by = a^2 - b^2$ and $bx + ay = 0$ then the value of $x + y$ is **[BOARD 2024]**
    a) $a^2 - b^2$ b) $a + b$ c) $a - b$ d) $a^2 + b^2$

32. What are the values of x and y for the following pair of linear equations?
    $99x + 101y = 499$ *and* $101x + 99y = 501$
    a) 3 and 6 b) 3 and 2 c) 2 and 3 d) 6 and 3

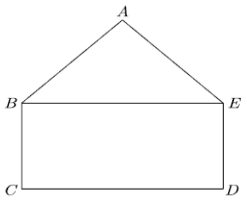
33. If $2x + y = 23$ *and* $4x - y = 19$ the value of $(5y - 2x)$ *and* $\left(\frac{y}{x} - 2\right)$ will be
    a) $-\frac{5}{7}, 31$ b) $31, -\frac{5}{7}$ c) $37, \frac{2}{7}$ d) $\frac{2}{7}, 37$

34. In the given figure, ABCD is a rectangle. The values of x and y will be



    a) 3 and 19 b) 19 and 3 c) 4 and 18 d) 18 and 4

35. In the figure, ABCDE is a pentagon with $BE \parallel CD$ and $BC \parallel DE$. BC is perpendicular to CD. $AB = 5\ cm, AE = 5\ cm, BE = 7\ cm, BC = x - y$ and $CD = x + y$. If the perimeter of ABCDE is 27 cm. The value of x and y will be



a) 3 and 2 b) 2 and 3 c) 1 and 6 d) 6 and 1

36. The pair of equations $x = a$ and $y = b$ graphically represents lines which are **[BOARD 2023]**

a) Parallel
b) coincident
c) intersecting at (a, b)
d) intersecting at (b, a)

37. If a pair of linear equations is consistent then the lines will be

a) Parallel
b) Intersecting or coincident
c) always coincident
d) always intersecting

38. What do you say about the lines represented by $2x + y = 3$ and $4x + 2y = 6$? **[BOARD 2023]**

a) Parallel
b) Intersecting
c) coincident
d) none of these

39. What do you say about the lines represented by $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$

a) Parallel
b) Intersecting
c) coincident
d) none of these

40. If $ad \neq bc$ then what do you say about the solution of the pair of linear equations $ax + by = p$ and $cx + dy = q$?

a) Unique solution
b) Infinitely many solution
c) two solution
d) no solution

41. If $am = bl$ then what do you say about the solution of the pair of linear equations $ax + by = c$ and $lx + my = n$?

a) Unique solution
b) Infinitely many solution
c) two solution
d) no solution

42. What do you say about the solution of the pair of linear equations $y = 0$ and $y = -5$

a) Unique solution
b) Infinitely many solution
c) two solution
d) no solution

43. The pair of equations $y = 0$ and $y = 7$ has **[BOARD 2024]**

a) Unique solution
b) Infinitely many solution
c) two solution
d) no solution

44. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has **[BOARD 2024]**

a) Unique solution
b) Infinitely many solutions
c) exactly two solutions
d) no solution

45. The pair of equations $3^{x+y} = 81,\ 81^{x-y} = 3$ has
    a) No solution
    b) infinitely many solutions
    c) unique solution
    d) $x = 2\frac{1}{8}, y = 1\frac{7}{8}$

46. The pair of linear equations $2x + 3y = 5\ and\ 4x + 6y = 10$ is
    a) Inconsistent
    b) Consistent
    c) dependent consistent
    d) none of these

47. The two digit number which becomes $\frac{5}{6}^{th}$ of itself when its digits are reversed. The difference in the digits of the number being 1, then the two digit number is
    a) 45 b) 54 c) 36 d) 63

48. In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed then the number is
    a) 36 b) 63 c) 48 d) 84

49. x and y are 2 different digits. If the sum of the two digit numbers formed by using both the digits is a perfect square, then the value of $x + y$ is
    a) 10 b) 11 c) 12 d) 13

50. A fraction becomes 4 when 1 is added to both the numerator and denominator and it becomes 7 when 1 is subtracted from both the numerator and denominator. The numerator of the given fraction is
    a) 2 b) 3 c) 5 d) 15

51. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. The fraction will be
    a) $\frac{7}{15}$ b) $\frac{8}{15}$ c) $\frac{6}{15}$ d) $\frac{9}{15}$

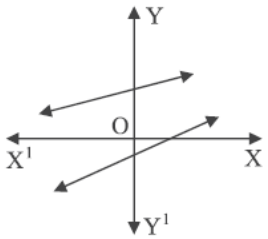
52. The father's age is six times his son's age. Four years hence, the age of the father will be four times his son's age. The present ages (in year) of the son and the father are, respectively
    a) 4 and 24 b) 5 and 30 c) 6 and 36 d) 3 and 24

53. Aruna has only Re 1 and Rs 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is Rs 75, then the number of Re 1 and Rs 2 coins are, respectively
    a) 35 and 15 b) 35 and 20 c) 15 and 35 d) 25 and 25

54. Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m. The dimensions of garden will be
    a) 20 m by 16 m b) 36 m by 10 m c) 16 m by 30 m d) 20 m by 16 m

55. 3 chairs and 1 table cost Rs 900, whereas 5 chairs and 3 tables cost Rs 2100. If the cost of 1 chair is Rs x and the cost of 1 table is Rs y then the situation can be represented algebraically as **[BOARD 2023]**
    a) $3x + y = 900, 3x + 5y = 2100$
    b) $3x + y = 900, 5x + 3y = 2100$
    c) $x + 3y = 900, 3x + 5y = 2100$
    d) $x + 3y = 900, 5x + 3y = 2100$

56. In the given figure, graphs of two linear equations are shown. The pair of these linear equations is **[BOARD 2024]**



a) Consistent with unique solution
b) Consistent with infinitely many solutions
c) Inconsistent
d) Inconsistent but can be made consistent by extending these lines.

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)
a) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)
b) Assertion (A) is true but reason (R) is false
c) Assertion (A) is false but reason (R) is true

57. ***Assertion (A):*** $x + y - 4 = 0$ *and* $2x + ky - 3 = 0$ has no solution if $k = 2$.
Reason (R): $a_1x + b_1y + c_1 = 0$ *and* $a_2x + b_2y + c_2 = 0$ are consistent if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$.

58. ***Assertion (A):*** Pair of linear equations $9x + 3y + 12 = 0$ *and* $8x + 6y + 24 = 0$ have infinitely many solution.
Reason (R): Pair of linear equations $a_1x + b_1y + c_1 = 0$ *and* $a_2x + b_2y + c_2 = 0$ have infinitely many solutions if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.

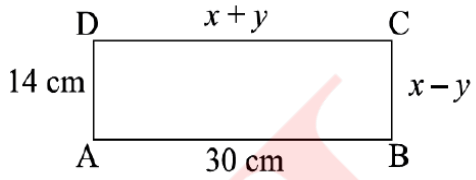
2 marks:

1. For what values of k will the following pair of linear equations have infinitely many solutions? $kx + 3y - (k - 3) = 0$ and $12x + ky - k = 0$.
2. For what value of k for which the following pair of linear equations have infinitely many solutions? $2x + 3y = 7,\ (k - 1)x + (k + 2)y = 3k$.
3. For what value of k for which the following pair of linear equations have infinitely many solutions? $2x - 3y = 7, (k + 2)x - (2k + 1)y = 3(2k - 1)$.
4. For what value of k will the following pair of linear equations have no solution? $3x + y = 1, (2k - 1)x + (k - 1)y = 2k + 1$.
5. Find the value of m for which the pair of linear equations.
$2x + 3y - 7 = 0$ *and* $(m - 1)x + (m + 1)y = (3m - 1)$ has infinitely many solutions.

6. For what value of p will the following pair of linear equations have infinitely many solutions? $(p-3)x+3y=p \; and \; px+py=12$.
7. Determine the values of a and b for which the following system of linear equations has infinite number of solutions: $2x-(a-4)y=2b+1 \; and \; 4x-(a-1)y=5b-1$.
8. If the system of equations $2x+3y=7 \; and \; (a+b)x+(2a-b)y=21$ has infinitely many solutions, then find a and b.
9. If $49x+51y=499, 51x+49y=501$ then find the values of x and y.
10. If $217x+131y=913, 131x+217y=827$ then find the values of x and y.

[BOARD 2023]

11. In figure, ABCD is a rectangle. Find the values of x and y.



12. Sumit is 3 times as old as his son. Five years later, he shall be two and a half time as old as his son. How old is Sumit at present?
13. Solve the pair of equations $x=3 \; \& \; y=-4$ graphically. **[BOARD 2023]**
14. Using graphical method, find whether following system of linear equations is consistent or not $x=0 \; \& \; y=-7$. **[BOARD 2023]**
15. Solve $7x-2y=5 \;\; \& \;\; 8x+7y=15$ and verify your answer. **[BOARD 2024]**
16. Sum of two numbers is 105 and their difference is 45. Find the numbers.

[BOARD 2024]

3 marks:

1. Solve for x and y: $\frac{x}{2}+\frac{2y}{3}=-1 \; and \; x-\frac{y}{3}=3$.
2. Solve the pair of linear equations: $8x+5y=9 \; and \; 3x+2y=4$.
3. Solve for x and y: $\frac{x+1}{2}+\frac{y-1}{3}=9 \; and \; \frac{x-1}{3}+\frac{y+1}{2}=8$.
4. Solve for x and y: $ax+by=\frac{a+b}{2} \; and \; 3x+5y=4$.
5. Solve graphically: $2x-3y+13=0 \; and \; 3x-2y+12=0$.
6. Solve graphically: $2x+3y=2 \; and \; x-2y=8$.
7. Find whether the following pair of linear equations has a unique solution. If yes, find the solution: $7x-4y=49 \; and \; 5x-6y=57$.
8. Solve: $152x-378y=-74 \; and \; -378x+152y=-604$.
9. Given the linear equation $2x+3y-8=0$, write another linear equation in two variables such that the geometrical representation of the pair so formed is:
   a) Intersecting lines
   b) Parallel lines
   c) Coincident lines
10. Represent the following pair of linear equations graphically and hence comment on the condition of consistency of this pair. $x-5y=6 \; and \; 2x-10y=12$.
11. Determine the values of m and n so that the following system of linear equation have infinite number of solutions: $(2m-1)x+3y-5=0 \; and \; 3x+(n-1)y-2=0$.

12. For what value of p will the following system of equations have no solution?

$$(2p-1)x+(p-1)y=2p+1 \; and \; y+3x-1=0$$

13. If the system of equations $2x+3y=7 \; and \; 2ax+(a+b)y=28$ has infinitely many solutions, then find a and b. **[BOARD 2023]**

14. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction. **[BOARD 2023]**

15. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers. **[BOARD 2023]**

16. The sum of the digits of a two digit number is 9. Also 9 times this number is twice the number obtained by reversing the order of the digits. Find the number.

17. A number consists of two digits. Where the number is divided by the sum of its digits, the quotient is 7. If 27 is subtracted from the number, the digits interchange their places, find the number.

18. A 2-digit number is seven times the sum of its digits. The number formed by reversing the digits is 18 less than the given number. Find the given number. **[BOARD 2023]**

19. The sum of the digits of a 2-digit number is 14. The number obtained by interchanging its digits exceeds the given number by 18. Find the number. **[BOARD 2024]**

20. Two numbers are in the ratio of 1: 3. If 5 is added to both the numbers, the ratio becomes 1: 2. Find the numbers.

21. Students of a class are made to stand in rows. If 4 students are extra in a row, there would be two rows less. If 4 students are less in a row, there would be four more rows. Find the number of students in the class.

22. A part of monthly hostel charges in a college is fixed and the remaining depends on the number of days one has taken food in the mess. When a student 'A' takes food for 22 days, he has to pay Rs.1380 as hostel charges. Whereas a student 'B' who takes food for 28 days, pays Rs. 1680 as hostel charges. Find the fixed charges and the cost of food per day. **[BOARD 2024]**

23. The ratio of income 2 persons is 9:7 and the ratio of their expenditure is 4:3, if each of them manage to save Rs.2000/ month. Find their monthly incomes.

24. A shop keeper gives books on rent for reading. She takes a fixed charge for first two days and an additional charge for each day thereafter. Latika paid Rs 22 for a book kept for six days, while Anand paid Rs 16 for the book kept for four days. Find the fixed charge and the charge for each extra day.

25. Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars? **[BOARD 2023]**

26. A train covered a certain distance at a uniform speed. If the train would have been 6 km/hr faster, it would have taken 4 hours less than the scheduled time. And if the train were slower by 6 km/hr, it would have taken 6 hours more than the scheduled time. Find the length of the journey.

27. Anuj had some chocolates and he divided them into two lots A and B. He sold the first lot at the rate of Rs 2 for 3 chocolates and the second lot at the rate of Re 1 per chocolate and got a total of Rs 400. If he had sold the first lot at the rate of Re 1 per chocolate and the second lot at the rate of Rs 4 for 5 chocolates, his total collection would have been Rs 460. Find the total number of chocolates he had.
28. Meena went to a bank to withdraw Rs.2000. She asked the cashier to give her Rs.50 and Rs. 100 notes only. Meena got 25 notes in all. How many notes of Rs. 50 and Rs.100 she received? **[BOARD 2024]**
29. A man wished to give Rs.12 to each person and found that he fell short of Rs. 6 when he wanted to give to all the persons present. He therefore, distributed Rs.9 to each person and found that Rs.9 were left over. How much money did he have and how many persons were there?
30. A father's age is three times the sum of the ages of his children. After 5 years, his age will be two times the sum of their ages. Find the present age of the father. **[BOARD 2023]**
31. Three years ago, Rashmi was thrice as old as Namza. Ten years later, Rashmi will be twice as old as Namza. How old are Rashmi and Namza now? **[BOARD 2024]**
32. In a chemistry lab, there is some quantity of 50% acid solution and some quantity of 25% acid solution. How much of each should be mixed to make 10 liters of 40% acid solution? **[BOARD 2024]**

5 marks:

1. For what value of k, which the following pair of linear equations have infinitely many solutions: $2x + 3y = 7 \; and \; (k+1)x + (2k-1)y = 4k + 1$.
2. Find c if the system of equations $cx + 3y + (3 - c) = 0, 12x + cy - c = 0$ has infinitely many solutions.
3. For what value of a and b does the following pair of linear equations have infinitely many solutions: $2x + 3y = 7, a(x + y) - b(x - y) = 3a + b - 2$.
4. Find the value of p and q for which the system of equations represent coincident lines $2x + 3y = 7 \; and \; (p + q + 1)x + (p + 2q + 2)y = 4(p + q) + 1$.
5. Solve for x and y: $2x - y + 3 = 0 \; and \; 3x - 5y + 1 = 0$.
6. Solve graphically: $x - y = 1 \; and \; 2x + y = 8$.
7. Solve graphically: $2x - y = 1 \; and \; x + 2y = 13$.
8. Solve graphically: $3x - 4y + 3 = 0 \; and \; 3x + 4y - 21 = 0$. **[BOARD 2024]**
9. Solve graphically: $2x + 3y = 12 \; and \; x - y - 1 = 0$.
10. Determine graphically whether the following pair of linear equations:
    $3x - y = 7 \; and \; 2x + 5y + 1 = 0$ has
    a) Unique solution
    b) Infinitely many solutions or
    c) No solution.
11. Draw the graph of the equations $x - y + 1 = 0 \; and \; 3x + 2y - 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and the X-axis and shade the triangular region.

12. Solve the pair of linear equations graphically:
    $x + 3y = 12, 2x - 3y = 12$
    Also shade the region bounded by the line $2x - 3y = 2$ and both the coordinate axes
13. Solve the pair of linear equations graphically:
    $x - y = 1, 2x + y = 8$
    Also find the coordinates of the points where the lines represented by the above equation intersect y-axis.
14. Aftab tells his daughter, '7 years ago, I was seven times as old as you were then. Also, 3 years from now, I shall be three times as old as you will be'. Represent this situation algebraically and graphically.
15. The cost of 2 kg apples and 1 kg of grapes on a day was found to be Rs 160. After a month, the cost of 4 kg of apples and 2 kg of grapes is Rs 300. Represent the situations algebraically and geometrically.
16. For Uttarakhand flood victims two sections A and B of class contributed Rs 1500. If the contribution of X-A was Rs 100 less than that of X-B, find graphically the amounts contributed by both the sections.
17. The area of rectangle gets reduced by 80 square units, if its length is reduced by 5 units and breadth is increased by 2 units. If we increase the length by 10 units and decrease the breadth by 5 units, the area increases by 50 square units. Find the dimensions of the rectangle. **[BOARD 2024]**
18. Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test?
    [BOARD 2023 & BOARD 2024]
19. If three times the greater of two numbers is divided by the smaller one, we get 4 as the quotient and 3 as the remainder. Also, if seven times the smaller number is divided by greater one, we get 5 as the quotient and 1 as the remainder. Find the numbers. **[BOARD 2024]**

Case based questions:

1. Two schools 'P' and 'Q' decided to award prizes to their students for two games of Hockey Rs x per student and Cricket Rs y per student. School 'P' decided to award a total of Rs 9,500 for the two games to 5 and 4 students respectively; while school 'Q' decided to award Rs 7,370 for the two games to 4 and 3 students respectively.
   [BOARD 2023]

Based on the above information, answer the following questions:

(i) Represent the following information algebraically (in terms of x and y). **1**

(ii) (a) What is the prize amount for hockey? **2**

OR

(b) Prize amount on which game is more and by how much? **2**

(iii) What will be the total prize amount if there are 2 students each from two games? **1**

2. A coaching institute of Mathematics conducts classes in two batches I and II and fees for rich and poor children are different. In batch I, there are 20 poor and 5 rich children, whereas in batch II, there are 5 poor and 25 rich children. The total monthly collection of fees from batch I is Rs 9000 and from batch II is Rs 26000. Assume that each poor child pays Rs x per month and each rich child pays Rs y per month. Based on the above information answer the following questions:

[BOARD 2023]

(i) Represent the situation in terms of x and y. **1**

(ii) Find the monthly fee paid by a poor child. **2**

OR

Find the difference in the monthly fee paid by a poor child and a rich child. **2**

(iii) If there are 10 poor and 20 rich children in batch II, what is the total monthly collection of fees from batch II? **1**

3. MASK: Masks are an additional step to help prevent people from getting and spreading COVID-19. They provide a barrier that keeps respiratory droplets from spreading. Wear a mask and take every day preventive actions in public settings. Due to ongoing Corona virus outbreak, Wellness Medical store has started selling masks of decent quality. The store is selling two types of masks currently type *A* and type *B*.

The cost of type *A* mask is Rs. 15 and of type *B* mask is Rs. 20. In the month of April, 2020, the store sold 100 masks for total sales of Rs. 1650.

(i) How many masks of each type were sold in the month of April? If the store had sold 50 masks of each type, what would be its sales in the month of April? **1**

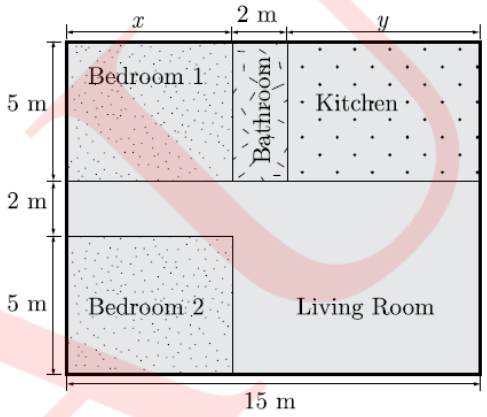
(ii) Due to great demand and short supply, the store has increased the price of each type by Rs. 5 from May 1, 2020. In the month of May, 2020, the store sold 310 masks for total sales of Rs. 6875. How many masks of each type were sold in the month of May? **1**

(iii) What percent of masks of each type sale was increased in the month of May, compared with the sale of month April? **2**

OR

What extra profit did store earn by increasing price in May month. **2**

4. Varsha is a licensed architect and design very innovative house. She has made a house layout for her client which is given below. In the layout, the design and measurements has been made such that area of two bedrooms and kitchen together is 95 sq. m.



(i) Which pair of linear equations does describe this situation? **1**

(ii) What is the length of the outer boundary of the layout. **1**

(iii) What is the area of bedroom 1? What is the area of living room in the layout? **2**

OR

What is the cost of laying tiles in Kitchen at the rate of Rs. 50 per sq. m? **2**

5. Mr. RK Agrawal is owner of a famous amusement park in Delhi. The ticket charge for the park is Rs 150 for children and Rs 400 for adult. Generally he does not go to park and it is managed by team of staff. One day Mr Agrawal decided to random check the park and went there. When he checked the cash counter, he found that 480 tickets were sold and Rs 134500 was collected. **[BOARD 2024]**

(i) Let the number of children visited be x and the number of adults visited be y. Which of the following is the correct system of equations that model the problem? **1**

(ii) How many children visited the park? How many adults visited the park? **1**

(iii) How much amount collected if 300 children and 350 adults visited the park? **2**

OR

One day total visited children and adults together are 750 and the total amount collected is Rs 212500. What are the number of children and adults visited the park? **2**

6. Dipesh bought 3 notebooks and 2 pens for Rs. 80. His friend Ramesh said that price of each notebook could be Rs. 25. Then three notebooks would cost Rs.75, the two pens would cost Rs. 5 and each pen could be for Rs. 2.50. Another friend Amar felt that Rs. 2.50 for one pen was too little. It should be at least Rs. 16. Then the price of each notebook would also be Rs.16.

Aditya also bought the same types of notebooks and pens as Dipesh. He paid 110 for 4 notebooks and 3 pens.

(i) Whether the estimation of Ramesh and Amar is applicable for Aditya? **1**

(ii) Let the cost of one notebook be x and that of pen be y. Which of the following set describe the given problem? **1**

(iii) What is the exact cost of the notebook? **2**

OR

What is the exact cost of the pen? What is the total cost if they purchase the same type of 15 notebooks and 12 pens. **2**

GRADE X

Question Bank (MATHEMATICS)

Chapter-4 Quadratic Equation

1 marks:

1. The quadratic equation $(x^2+1)^2 - x^2 = 0$ has
   a) Four real roots
   b) No real roots
   c) two real roots
   d) one real root

2. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has
   a) Two distinct real roots
   b) No real roots
   c) two equal real roots
   d) more than 2 real roots

3. The quadratic equation $2x^2 - 3\sqrt{2}x + \frac{9}{4} = 0$ has
   a) Two distinct real roots
   b) No real roots
   c) two equal real roots
   d) more than 2 real roots

4. The quadratic equation $x^2 + 3x + 2\sqrt{2} = 0$ has
   a) Two distinct real roots
   b) No real roots
   c) two equal real roots
   d) more than 2 real roots

5. The quadratic equation $5x^2 - 3x + 1 = 0$ has **[BOARD 2024]**
   a) Two distinct real roots
   b) No real roots
   c) two equal real roots
   d) more than 2 real roots

6. Nature of roots of quadratic equations $2x^2 - 4x + 3 = 0$ is
   a) Real b) equal c) not real d) none of them

7. The roots of the quadratic equation $x^2 - 0.04 = 0$ are **[BOARD 2023]**
   a) ± 0.2 b) ± 0.02 c) 0.4 d) 2

8. What is the positive real root of $64x^2 - 1 = 0$?
   a) 1/8 b) 1/4 c) 1/2 d) 1/6

9. The real roots of the equation $x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 = 0$ are
   a) 1, 8 b) -1, -8 c) -1, 8 d) 1, -8

10. If ½ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is **[BOARD 2024]**
    a) 2 b) -2 c) ¼ d) ½

11. If $r = 3$ is a root of quadratic equation $kr^2 - kr - 3 = 0$ then the value of k is
    a) 1/2 b) 3 c) 1/3 d) 1/4

12. If $x = 0.3$ is a root of the equation $x^2 - 0.9k = 0$ then k is **[BOARD 2023]**
    a) 1 b) 10 c) 0.1 d) 100

13. If p is the root of the equation $x^2 - (p+q)x + k = 0$ then the value of k is
    a) p b) q c) p+q d) pq

14. If the roots of the equation $ax^2 + bx + c = 0, a \neq 0$ are real and equal then which of the following relation is true? **[BOARD 2024]**

a) $a = \frac{b^2}{c}$ b) $b^2 = ac$ c) $ac = \frac{b^2}{4}$ d) $c = \frac{b^2}{a}$

15. If the quadratic equation $x^2 + 4x + k = 0$ has real and equal roots, then

a) $k < 4$ b) $k > 4$ c) $k = 4$ d) $k \geq 4$

16. Value(s) of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is/are

a) 0 b) 4 c) 8 d) 0, 8

17. Find the value of k for which the equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal roots. **[BOARD 2023]**

a) 2 b) 3 c) 4 d) 5

18. If $x^2 + k(4x + k - 1) + 2 = 0$ has equal roots, then k is

a) $-\frac{2}{3}, 1$ b) $\frac{2}{3}, -1$ c) $\frac{3}{2}, \frac{1}{3}$ d) $\frac{3}{2}, -\frac{1}{3}$

19. If the quadratic equation $ax^2 + bx + c = 0$ has two real and equal roots then c is **[BOARD 2023 & BOARD 2024]**

a) $\frac{-b}{2a}$ b) $\frac{b}{2a}$ c) $\frac{-b^2}{4a}$ d) $\frac{b^2}{4a}$

20. The quadratic equations $x^2 - 4x + k = 0$ has distinct real roots if

a) $k = 4$ b) $k > 4$ c) $k = 16$ d) $k < 4$

21. The least positive value of k for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots, is **[BOARD 2023]**

a) $\pm 2\sqrt{2}$ b) 2 c) ± 2 d) $\sqrt{2}$

22. Let p be a prime number. The quadratic equation having its roots as factors of p is

a) $x^2 - px + p = 0$ c) $x^2 - (p + 1)x + p = 0$

b) $x^2 + (p + 1)x + p = 0$ d) $x^2 - px + p + 1 = 0$

23. Which of the following equation has 2 as a root?

a) $x^2 - 4x + 5 = 0$ c) $x^2 + 3x - 12 = 0$

b) $2x^2 - 7x + 6 = 0$ d) $3x^2 - 6x - 2 = 0$

24. Which of the following equations has the sum of its roots as 4? **[BOARD 2023]**

a) $2x^2 - 4x + 8 = 0$ c) $-x^2 + 4x + 4 = 0$

b) $\sqrt{2}x^2 - \frac{4}{\sqrt{2}}x + 1 = 0$ d) $4x^2 - 4x + 4 = 0$

25. A quadratic equation whose roots are $2 + \sqrt{3}$ *and* $2 - \sqrt{3}$ is **[BOARD 2023]**

a) $x^2 - 4x + 1 = 0$ c) $x^2 + 4x + 1 = 0$

b) $4x^2 - 3 = 0$ d) $x^2 - 1 = 0$

26. Each root $x^2 - bx + c = 0$ is decreased by 2. The resulting equation is $x^2 - 2x + 1 = 0$ then

a) $b = 6, c = 9$ b) $b = 3, c = 5$ c) $b = 2, c = -1$ d) $b = -4, c = 3$

27. If one root of the equation $ax^2 + bx + c = 0$ is the reciprocal of the other, then
a) $b = c$ b) $a = b$ c) $ac = 1$ d) $a = c$

28. If one root of the equation $(k-1)x^2 - 10x + 3 = 0$ is the reciprocal of the other then the value of k is
a) 2 b) 3 c) 4 d) 5

29. The linear factors of the quadratic equation $x^2 + kx + 1 = 0$ are
a) $k \geq 2$ b) $k \leq 2$ c) $k \geq -2$ d) $2 \leq k \leq -2$

30. The condition for one root of the quadratic equation $ax^2 + bx + c = 0$ to be twice the other, is
a) $b^2 = 4ac$ b) $2b^2 = 9ac$ c) $c^2 = 4a + b^2$ d) $c^2 = 9a - b^2$

31. The equation $2x^2 + 2(p+1)x + p = 0$ where p is real, always has roots that are
a) Equal c) equal in magnitude but opposite in sign
b) Irrational d) real

32. If α *and* β are roots of $ax^2 - bx + c = 0 (a \neq 0)$ then value of $\alpha + \beta$ is
a) $\frac{b}{a}$ b) $\frac{a}{b}$ c) $\frac{2a}{b}$ d) $\frac{a}{2b}$

33. If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is **[BOARD 2024]**
a) 1 b) 0 c) -1 d) $\sqrt{2}$

34. The ratio of the sum and product of the roots of the quadratic equation $5x^2 - 6x + 21 = 0$ is **[BOARD 2024]**
a) 5:21 b) 2:7 c) 21:5 d) 7:2

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

a) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

b) Assertion (A) is true but reason (R) is false

c) Assertion (A) is false but reason (R) is true

35. ***Assertion (A):*** $4x^2 - 12x + 9 = 0$ has repeated roots.
Reason (R): The quadratic equation has repeated roots if discriminant $D > 0$.

36. ***Assertion (A):*** The equation $x^2 + 3x + 1 = (x-2)^2$ has repeated roots.
Reason (R): Any equation of the form $ax^2 + bx + c = 0$ where $a \neq 0$, is called a quadratic equation.

37. ***Assertion (A):*** The value of x are $\frac{-a}{2}$, a for a quadratic equation $2x^2 + ax - a^2 = 0$.

    Reason (R): For quadratic equation $ax^2 + bx + c = 0$ where $\neq 0$ $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$.

38. ***Assertion (A):*** The equation $8x^2 + 3kx + 2 = 0$ has equal roots then the value of k is $\pm\frac{8}{3}$.

    Reason (A): The equation $ax^2 + bx + c = 0$ has equal roots if $D = b^2 - 4ac = 0$.

39. ***Assertion (A):*** The roots of the quadratic equation $x^2 + 2x + 2 = 0$ are imaginary.

    Reason (R): If discriminant $D = b^2 - 4ac < 0$ then the roots of the quadratic equation $ax^2 + bx + c = 0$ are imaginary.

40. ***Assertion (A):*** If $5 + \sqrt{7}$ is a root of a quadratic equation with rational co-efficient then its other root is $5 - \sqrt{7}$.

    Reason (R): Surd roots of the quadratic equation with rational coefficient occur in conjugate pairs. **[BOARD 2023]**

2 marks:

1. Find the sum and product of the roots of the quadratic equation $2x^2 - 9x + 4 = 0$. **[BOARD 2023]**
2. Find the discriminant of the quadratic equation $4x^2 - 5 = 0$ and hence comment on the nature of roots of the equation. **[BOARD 2023]**
3. A natural number when increased by 12 equals 160 times the reciprocal. Find the number. **[BOARD 2023]**
4. If one root of the quadratic equation $x^2 + 12x - k = 0$ is thrice the other root, then find the value of k. **[BOARD 2023]**

3 marks:

1. Solve: $\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2.$
2. Solve: $\frac{1}{x} + \frac{2}{2x-3} = \frac{1}{x-2}, x \neq 0, \frac{2}{3}, 2.$
3. Solve: $\frac{1}{x+4} - \frac{1}{x+7} = \frac{11}{30}, x \neq -4, -7.$
4. Solve: $\frac{x+1}{x-1} + \frac{x-2}{x+2} = 4 - \frac{2x+3}{x-2}, x \neq 1, -2, 2.$
5. Solve: $\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0, x \neq 3, \frac{-3}{2}.$
6. Solve: $x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a}\right)x + 1 = 0.$
7. Solve: $\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}, x \neq 1, 2, 3.$
8. Find the value of p for which the quadratic equation $px(x-2) + 6 = 0$ has two equal real roots. **[BOARD 2023]**
9. Find the value of p for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other.

10. The sum of two numbers is 15. If the sum of their reciprocals is $\frac{3}{10}$ find the two numbers. **[BOARD 2023]**
11. If α *and* β are roots of the quadratic equation $x^2 - 7x + 10 = 0$ find the quadratic equation whose roots are α^2 *and* β^2. **[BOARD 2023]**
12. In a 2-digit number, the digit at the unit's place is 5 less than the digit at the ten's place. The product of the digits is 36. Find the number. **[BOARD 2024]**
13. Three consecutive integers are such that sum of the square of second and product of other two is 161. Find the three integers. **[BOARD 2024]**
14. A dealer sells an article for Rs 75 and gains as much percent as the cost price of the article. Find the cost price of the article. **[BOARD 2024]**

5 marks:

1. Solve: $\left(\frac{2x}{x-5}\right)^2 + \left(\frac{2x}{x-5}\right) - 24 = 0, x \neq 5.$
2. Solve: $\frac{x+3}{x-2} - \frac{1-x}{x} = \frac{17}{4}, x \neq 0, 2.$
3. Solve: $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}, x \neq -1, -2, -4.$
4. Solve: $4x^2 + 4bx - (a^2 - b^2) = 0.$
5. Find x in terms of a, b and c: $\frac{a}{x-a} + \frac{b}{x-b} = \frac{2c}{x-c}, x \neq a,\ b, c.$
6. Solve: $\frac{x-1}{2x+1} + \frac{2x+1}{x-1} = 2$ where $x \neq \frac{-1}{2}, 1.$
7. Solve: $\frac{1}{x-2} + \frac{2}{x-1} = \frac{6}{x}, x \neq 0, 1, 2.$
8. Solve: $\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$
9. If $x = -2$ is a root of the equation $3x^2 + 7x + p = 0$ find the value of k so that the roots of the equation $x^2 + k(4x + k - 1) + p = 0$ are equal.
10. Find the values of k for which the equation $(3k + 1)x^2 + 2(k + 1)x + 1$ has equal roots. Also find the roots. **[BOARD 2024]**
11. Find the value of p for which the quadratic equation $(p + 1)x^2 - 6(p + 1)x + 3(p + 9) = 0, p \neq -1$ has equal roots. **[BOARD 2024]**
12. Find the positive values of k for which the quadratic equations $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ both will have the real roots.
13. Write all values of p for which the quadratic equation $x^2 + px + 16 = 0$ has equal roots. Find the roots of the equation so obtained.
14. If the roots of the quadratic equation $(x - a)(x - b) + (x - b)(x - c) + (x - c)(x - a) = 0$ are equal. Then show that $a = b = c$.
15. A two digit number is such that product of its digits is 14. If 45 is added to the number, the digits interchange their places. Find the number. **[BOARD 2024]**
16. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11 km/hr more than that of the passenger train, find the average speed of the two trains.

17. A fast train takes 3 hours less than a slow train for a journey of 60 km. If the speed of the slow train is 10 km/hr less than that of the fast train, find the speed of each train.
18. A train travels at a certain average speed for a distance of 54 km and then travels at a distance of 63 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete total journey, what is the original average speed? **[BOARD 2023]**
19. A train travels a distance of 90 km at a constant speed. Had the speed been 15 km/hr more, it would have taken 30 minutes less for the journey. Find the original speed of the train. **[BOARD 2024]**
20. A motor boat whose speed is 18 km/hr in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.
21. A motor boat whose speed in still water is 9 km/hr, goes 15 km downstream and comes back to the same spot, in a total time of 3 hours 45 minutes. Find the speed of the stream.
22. A motor boat whose speed is 15 km/hr in still water goes 30 km downstream and comes back in 4 hours 30 minutes. Find the speed of the stream.
23. To fill a swimming pool two pipes are used. If the pipe of larger diameter used for 4 hours and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. Find, how long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter to fill the pool?
24. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr from its usual speed and the time of the flight increased by 30 minutes. Find the scheduled duration of the flight. **[BOARD 2024]**
25. A person on tour has Rs.4200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by Rs70. Find the original duration of tour.
26. A person on tour has Rs.360 for his expenses. If he extends his tour for 4 days, he has to cut down his daily expenses by Rs.3. Find the original duration of the tour.
27. If the price of the book is reduced by Rs. 5, a person can buy 4 more books for Rs. 600. Find the original price of the book.
28. Two water taps together can fill a tank in $\frac{15}{8}$ hours. The tap of larger diameter takes 2 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. **[BOARD 2023]**
29. Two pipes running together can fill a cistern in $3\frac{1}{13}$ hours. If one pipe takes 3 hours more than the other to fill it, find the time in which each pipe would fill the cistern.
30. A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square meters more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find its length and breadth.

31. Some students planned a picnic. The total budget for food was Rs. 2,000. But 5 students failed to attend the picnic and thus the cost of food for each member increased by Rs. 20. How many students attended the picnic and how much did each student pay for the food?
32. If Zeba was younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than five times her actual age. What is her age now?
33. The age of a man is twice the square of the age of his son. Eight years hence, the age of the man will be 4 years more than three time the age of his son. Find their present ages. **[BOARD 2024]**
34. Rs.6500 were divided equally among a certain number of persons. Had there been 15 more persons, each would have got Rs. 30 less. Find the original number of persons.
35. A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B to finish the work.
36. The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its reciprocal is $2\frac{16}{21}$, find the fraction. **[BOARD 2024]**
37. The side of a square exceeds the side of another square by 4 cm and the sum of the areas of the two squares is 400 cm^2. Find the sides of the squares. **[BOARD 2024]**

Case Based Questions:

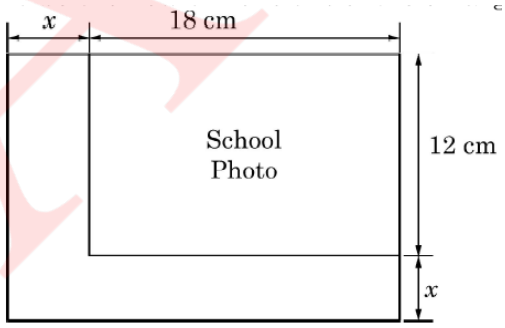
1. While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide. **[BOARD 2023]**

   Based on the above information, answer the following questions:

   (i) Write an algebraic equation depicting the above information. **1**

   (ii) Write the corresponding quadratic equation in standard form. **1**

   (iii) What should be the new dimensions of the enlarged photo? **2**



OR

Can any rational value of x make the new area equal to 220cm^2? **2**

2. In an auditorium, seats are arranged in rows and columns. The number of rows are equal to the number of seats in each row. When the number of rows are doubled and the number of seats in each row is reduced by 10, the total number of seats increases by 300.

Based on the above information answer the following:

(i) If x is taken as number of row in original arrangement, write the quadratic equation that describes the situation? **1**

(ii) How many number of rows are there in the original arrangement? **1**

(iii) How many number of seats are there in the auditorium in original arrangement ? How many number of seats are there in the auditorium after re-arrangement. **2**

OR

How many number of columns are there in the auditorium after re-arrangement? **2**

3. A rectangular floor area can be completely tiled with 200 square tiles. If the side length of each tile is increased by 1 unit, it would take only 128 tiles to cover the floor. **[BOARD 2024]**

(i) Assuming the original length of each side of a tile be x units, makes a quadratic equation from the above information. **1**

(ii) Write the corresponding quadratic equation in standard form. **1**

(iii) Find the values of x, the length of side of a tile by factorization. **2**

OR

Solve the quadratic equation for x, using quadratic formula. **2**

GRADE X

Question Bank (MATHEMATICS)

Chapter-5 Arithmetic Progression

1 marks:

1. In an AP, if $d = -4, n = 7, a_n = 4$ then a is equal to

   a) 6 b) 7 c) 20 d) 28

2. In an AP, if $a = 3.5, d = 0$ *and* $n = 101$ then a_n will be

   a) 0 b) 3.5 c) 103.5 d) 104.5

3. The n^{th} term of the AP $a, 3a, 5a, \ldots$ is

   a) na b) $(2n-1)a$ c) $(2n+1)a$ d)$2na$

4. Which term of an AP $21, 42, 63, 84, \ldots$ is 210? **[BOARD 2024]**

   a) 9^{th} b) 10^{th} c) 11^{th} d) 12^{th}

5. If the common difference of an AP is 5, then what is $a_{18} - a_{13}$?

   a) 5 b) 20 c) 25 d) 30

6. What is the common difference of an AP in which $a_{18} - a_{14} = 32$? **[BOARD 2024]**

   a) 8 b) -8 c) -4 d) 4

7. The common difference of the AP $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \ldots$ is **[BOARD 2024]**

   a) 1 b) $\frac{1}{p}$ c) $-\frac{1}{p}$ d) -1

8. The common difference of the A.P whose n^{th} term is given by $a_n = 3n + 7$ is **[BOARD 2023 & BOARD 2024]**

   a) 7 b) 3 c) 3n d) 1

9. The common difference of the A.P whose n^{th} term is given by $a_n = 5n - 7$ is **[BOARD 2023]**

   a) -7 b) 7 c) 5 d) -2

10. The first term of AP is p and the common difference is q, then its 10^{th} term is

    a) $q + 9p$ b) $p - 9q$ c) $p + 9q$ d) $2p + 9q$

11. The 4^{th} term from the end of an AP $-11, -8, -5, \ldots, 49$ is

    a) 37 b) 40 c) 43 d) 58

12. The 11^{th} term from the end of the A.P $10, 7, 4, \ldots, -62$ is **[BOARD 2023]**

    a) 25 b) 16 c) -32 d) 0

13. The 13^{th} term from the end of the A.P 20, 13, 6, -1,..., -148 is **[BOARD 2023]**

    a) 57 b) -57 c) 64 d) -64

14. The 11th term of an AP $-5, \frac{-5}{2}, 0, \frac{5}{2}, \ldots$ is

a) -20 b) 20 c) -30 d) 30

15. There are 60 terms is an AP of which the first term is 8 and the last term is 185. The 31st term is

a) 56 b) 94 c) 85 d) 98

16. The 11th and 13th terms of an AP are 35 and 41 respectively, its common difference is

a) 38 b) 32 c) 6 d) 3

17. The next term of the A.P $\sqrt{6}, \sqrt{24}, \sqrt{54}, \ldots$ is **[BOARD 2023]**

a) $\sqrt{60}$ b) $\sqrt{96}$ c) $\sqrt{72}$ d) $\sqrt{216}$

18. The next term of the A.P $\sqrt{7}, \sqrt{28}, \sqrt{63}, \ldots$ is **[BOARD 2023]**

a) $\sqrt{70}$ b) $\sqrt{80}$ c) $\sqrt{97}$ d) $\sqrt{112}$

19. The two APs have the common difference. The first term of one of these is -1 and that of the other is -8. Then the difference between their 4th terms is

a) -1 b) -8 c) 7 d) -9

20. The first four terms of an AP whose first term is -2 and the common difference is -2 are

a) $-2, 0, 2, 4$ b) $-2, 4, -8, 16$ c) $-2, -4, -6, -8$ d) $-2, -4, -8, -16$

21. If the first term of an AP is -5 and the common difference is 2, then the sum of the first 6 terms is **[BOARD 2024]**

a) 0 b) 5 c) 6 d) 15

22. The sum of first 16 terms of the AP $10, 6, 2, \ldots$ is

a) -320 b) 320 c) -352 d) -400

23. Sum of first 200 natural numbers **[BOARD 2024]**

a) 2010 b) 2000 c) 20100 d) 21000

24. In an AP, if $a = 1, a_n = 20, S_n = 399$ then n is equal to **[BOARD 2024]**

a) 19 b) 21 c) 38 d) 42

25. If the n^{th} term of an AP is given by $a_n = 5n - 3$ then the sum of first 10 terms if

a) 225 b) 245 c) 255 d) 270

26. An AP starts with a positive fraction and every alternate term is an integer. If the sum of the first 11 terms is 33, then the fourth term is

a) 2 b) 3 c) 5 d) 6

27. If the sum of the first 2n terms of $2, 5, 8, \ldots$ is equal to the sum of the first n terms of $57, 59, 61, \ldots$ then n is equal to

a) 10 b) 11 c) 12 d) 13

28. If the sum of the first n terms of an AP is $3n^2 + n$ and its common difference is 6, then its first term is **[BOARD 2023]**

a) 1 b) 2 c) 3 d) 4

29. If $p - 1, p + 1 \; and \; 2p + 3$ are in A.P then the value of p is **[BOARD 2023]**

a) -2 b) 4 c) 0 d) 2

30. If $k + 2, 4k - 6 \; and \; 3k - 2$ are three consecutive terms of an A.P then the value of k **[BOARD 2023 & BOARD 2024]**

a) 3 b) -3 c) 4 d) -4

31. If a, b, c form an A.P with common difference d, then the value of $a - 2b - c$ is **[BOARD 2023]**

a) $2a + 4d$ b) 0 c) $-2a - 4d$ d) $-2a - 3d$

32. Three numbers in A.P have the sum 30. What is its middle term? **[BOARD 2024]**

a) 4 b) 10 c) 16 d) 8

33. The number of terms of an A.P $3, 6, 9, \ldots 111$ is **[BOARD 2024]**

a) 36 b) 40 c) 37 d) 30

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

34. ***Assertion (A):*** Common difference of the AP $-5, -1, 3, 7, \ldots$ is 4.

Reason (R): Common difference of the AP $a, a + d, a + 2d, \ldots$ is given by $d = a_2 - a_1$.

35. ***Assertion (A):*** Sum of first 10 terms of the AP $-0.5, -1.0, -1.5, \ldots$ is 31.

Reason (R): Sum of n terms of the AP is $S_n = \frac{n}{2}[2a + (n-1)d]$.

36. ***Assertion (A):*** $a_n - a_{n-1}$ is not independent of n then the given sequences is an AP.

Reason (R): Common difference $d = a_n - a_{n-1}$ is constant or independent of n.

37. ***Assertion (A):*** If n^{th} term of an AP is $7 - 4n$ then its common difference is -4.

    Reason (R): Common difference of an AP is $d = a_{n+1} - a_n$.

38. ***Assertion (A):*** If sum of the first n terms of an AP is $S_n = 3n^2 - 4n$. Then its n^{th} term is $a_n = 6n - 7$.

    Reason (R): n^{th} term of an AP, whose sum to n terms is S_n is given by, $a_n = S_n - S_{n-1}$.

39. ***Assertion (A):*** a, b, c are in A.P if and only if $2b = a + c$.

    Reason (R): The sum of first n odd natural numbers is n^2. **[BOARD 2023]**

40. ***Assertion (A):*** $-5, -\frac{5}{2}, 0, \frac{5}{2}, \ldots$ is an AP.

    Reason (R): The terms of an AP cannot have both positive and negative rational numbers.

2 marks:

1. If the number $x + 3, 2x + 1$ *and* $x - 7$ are in AP find the value of x.
2. Find the values of a, b and c such that the numbers $a, 10, b, c, 31$ are in AP.
3. Find the 21st term of the AP $-4\frac{1}{2}, -3, -1\frac{1}{2}, \ldots$
4. Find the 7th term from the end of AP $7, 10, 13, \ldots, 184$.
5. Find the middle term of the AP $213, 205, 197, \ldots, 37$.
6. Find, 100 is a term of the AP $25, 28, 31, \ldots$ or not.
7. Is 184 a term of the sequence $3, 7, 11, \ldots$?
8. How many two digits numbers are divisible by 3?
9. If the n^{th} term of an AP $-1, 4, 9, 14, \ldots$ is 129. Find the value of n?
10. Write the n^{th} term of an AP $\frac{1}{m}, \frac{1+m}{m}, \frac{1+2m}{m}, \ldots$
11. Which term of the AP $3, 15, 27, 39, \ldots$ will be 120 more than its 21st term?
12. The 8th term of an AP is zero. Prove that its 38th term is triple of its 18th term.
13. For AP show that $a_p + a_{p+2q} = 2a_{p+q}$.
14. In an AP, 32nd term is twice the 12th term. Prove that 70th term is twice the 31st term.
15. The seventeenth term of an AP exceeds its 10th term by 7. Find the common difference.
16. If five times the fifth term of an AP is equal to eight times its eighth term, show that its 13th term is zero.

17. The ninth term of an AP is -32 and the sum of its eleventh and thirteenth term is -94. Find the common difference of the AP.
18. How many terms of AP $3, 5, 7, 9, \ldots$ must be taken to get the sum 120?
19. Find the sum of first ten multiple of 5.
20. Find the sum of first 15 multiples of 8.
21. What is the sum of five positive integer divisible by 6?
22. Find the sum of first 16 terms of the AP 10, 6, 2…
23. If S_n the sum of first n terms of an AP is given by $S_n = 3n^2 - 4n$. Find the n^{th} term.
24. If the sum of n terms of an AP is $2n^2 + 5n$ then find the 4^{th} term.
25. If the sum of first n terms of an AP is n^2, then find its 10^{th} term.
26. If the sum of first k terms of an AP is $3k^2 - k$ and its common difference is 6. What is the first term?
27. The fifth term of an AP is 20 and the sum of its seventh and eleventh terms is 64. Find the common difference.
28. The fourth term of an AP is 11. The sum of the fifth and seventh terms of the AP is 34. Find the common difference.
29. If the sum of first m terms of an AP is the same as the sum of its first n terms, show that the sum of its first $(m + n)$ terms is zero.
30. If S_n denotes the sum of n terms of an AP whose common difference is d and first term is a, find $S_n = 2s_{n-1} + S_{n-2}$.

3 marks:

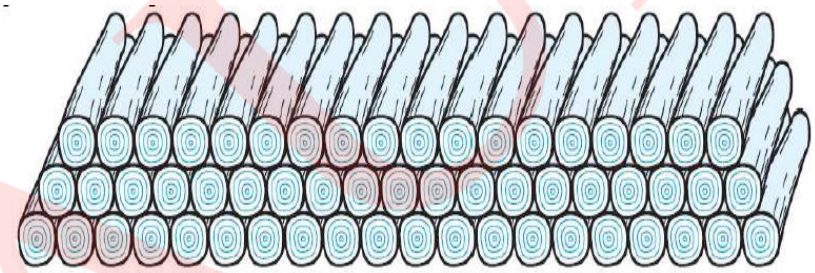
1. The sum of four consecutive number in AP is 32 and the ratio of the product of the first and last term to the product of two middle terms is 7: 15. Find the numbers.
2. The sum of the first 7 terms of an AP is 63 and that of its next 7 terms is 161. Find the AP.
3. The sum of the 5^{th} and the 9^{th} terms of an AP is 30. If its 25^{th} term is three times its 8^{th} term find the AP.
4. If the ratio of the sum of first n terms of two AP's is $(7n + 1): (4n + 27)$ find the ratio of their m^{th} terms.
5. Which term of the AP $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \ldots$ is the first negative term.
6. Which term of the AP $65, 61, 57, 53, \ldots$ is the first negative term. **[BOARD 2023]**
7. Find the middle term of the AP $7, 13, 19, \ldots, 247$.

8. Show that the sum of all terms of an AP whose first term is a, the second term is b and the last term is c, is equal to $\frac{(a+c)(b+c-2a)}{2(b-a)}$.
9. If in an AP, the sum of first m terms is n and the sum of its first n terms is m, then prove that the sum of its first $(m+n)$ terms is $-(m+n)$.
10. If the sum of first m terms of an A.P is same as sum of its first n terms $(m \neq n)$ then show that the sum of its first $(m+n)$ terms is zero. **[BOARD 2024]**
11. The 17th term of an AP is 5 more than twice its 8th term. If 11th term of AP is 43, then find its n^{th} term.
12. How many terms are there in an A.P whose first and fifth terms are -14 and 2 respectively and the last term is 62. **[BOARD 2023]**
13. The sum of first 15 terms of an A.P is 750 and its first term is 15. Find its 20th term and n^{th} term. **[BOARD 2023 & BOARD 2024]**
14. Rohan repays his total loan of Rs 1,18,000 by paying every month starting with the first installment of Rs 1,000. If he increases the installment by Rs 100 every month, what amount will be paid by him in the 30th installment? What amount of loan has he paid after 30th installment? **[BOARD 2023]**
15. If p^{th} term of an A.P is q and q^{th} term is p, then prove that its n^{th} term is $(p+q-n)$ **[BOARD 2023]**
16. In an A.P the sum of the first n terms is given by $S_n = 6n - n^2$. Find its 30th term. **[BOARD 2023]**
17. Find the common difference of an A.P whose first term is 8, the last term is 65 and the sum of all its terms is 730. **[BOARD 2023]**
18. Find the sum of all integers between 50 and 500, which are divisible by 7. **[BOARD 2023]**
19. How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3? Also find their sum. **[BOARD 2023]**
20. In an A.P, the sum of three consecutive terms is 24 and the sum of their squares is 194. Find the numbers. **[BOARD 2024]**
21. If the sum of first 7 terms of an A.P is 49 and that of first 17 terms is 289, find the sum of its first 20 terms. **[BOARD 2024]**
22. The first term of an A.P is 5, the last term is 45 and the sum of all the terms is 400. Find the number of terms and the common difference. **[BOARD 2024]**

23. The ratio of the 10^{th} term to its 30^{th} term of an A.P is 1:3 and the sum of its first six terms is 42. Find the first term and the common difference of A.P. **[BOARD 2024]**
24. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was Rs 15,000 after 4 years of service and Rs 18000 after 10 years of service, what was his starting salary and what was the annual increment? **[BOARD 2024]**

5 marks:

1. The ratio of 11^{th} term to 17^{th} term of an A.P is 3:4. Find the ratio of 5^{th} term to 21^{st} term of the same A.P. Also find the ratio of the sum of first 5 terms to that of first 21 terms. **[BOARD 2023]**
2. How many terms of an A.P $45, 39, 33, \ldots$ must be taken so that their sum is 180? Explain the double answer. **[BOARD 2023]**
3. 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on (see below figures). In how many rows are the 200 logs placed and how many logs are in the top row? **[BOARD 2023]**



4. The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of an AP. **[BOARD 2023]**
5. The sum of first and eighth terms of an A.P is 32 and their product is 60. Find the first term and common difference of the A.P. Hence, also find the sum of its first 20 terms. **[BOARD 2024]**
6. Solve the equation for x: $1 + 4 + 7 + 10 + \cdots + x = 287$. **[BOARD 2023]**
7. Solve the equation: $-4 + (-1) + 2 + 5 + \cdots + x = 437$. **[BOARD 2023]**
8. If the sum of first 6 terms of an AP is 36 and that of the first 16 terms is 256 then find the sum of first 10 terms. **[BOARD 2023]**

9. Poorna saves Rs 32 during the first month, Rs 36 in the second month and Rs 40 in the third month. If she continues to save in this manner, in how many months will she save Rs 2000? **[BOARD 2023]**
10. The sum of first seven terms of an AP is 182. If its 4^{th} term and the 17^{th} term are in the ratio 1:5, find the A.P. **[BOARD 2023]**
11. The sum of first q terms of an AP is $63q - 3q^2$. If its p^{th} term is -60, find the value of p. Also find the 11^{th} term of this AP. **[BOARD 2023]**
12. Find the sum of integers between 100 and 200 which are
    (i) Divisible by 9
    (ii) Not divisible by 9. **[BOARD 2023]**
13. In an A.P of terms, the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Determine the first term and common difference of A.P. Also, find the sum of all the terms of the A.P. **[BOARD 2024]**

Case Based Questions:

1. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.

(i) If the first circular row has 30 seats, how many seats will be there in the 10th row? **1**

(ii) For 1500 seats in the auditorium, how many rows need to be there? **2**

OR

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row? **2**

(iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row? **1**

2. Manpreet Kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86m at the Asian Grand Prix in 2017 is the biggest distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56m only. Being an athlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9cm every week. During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of throws by 12 to achieve this remarkable progress.

(i) How many throws Sanjitha practiced on 11th day of the camp? **1**

(ii) What would be Sanjitha's throw distance at the end of 6 months? **2**

OR

When will she be able to achieve a throw of 11.16 m? **2**

(iii) How many throws did she do during the entire camp of 15 days? **1**

3. Salary : In investigating different job opportunities, you find that firm A will start you at Rs 25,000 per year and guarantee you a raise of Rs 1,200 each year whereas firm B will start you at Rs 28,000 per year but will guarantee you a raise of only Rs 800 each year.

(i) Over a period of 15 years, how much would you receive from firm A? **1**

(ii) Over a period of 15 years, how much would you receive from firm B? **1**

(iii) What would be your annual salary at firm A for the tenth year? **2**

OR

What would be your annual salary at firm B for the tenth year? **2**

4. Bequests to Charity: At the time our mother left this Earth, she gave Rs 90000 to her children of birth. This we kept and each year added Rs 30000 more, as a lasting memorial from the children she bore. When Rs 4,20,000 is thusly attained, all goes to charity that her memory be maintained.

(i) What was the balance in the sixth year? **1**
(ii) In what year was the goal of Rs 420,000 met? **2**

5. It takes 5 toothpicks to build the top trapezoid shown at below. You need 9 toothpicks to build 2 adjoined trapezoids and 13 toothpicks for 3 trapezoids.

(i) If 1000 toothpicks are available, how many trapezoids will be in the last complete row? **1**
(ii) How many complete rows will there be? **1**
(iii) How many toothpicks will you use to construct these rows? **1**

6. A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year.

(i) What is the production in the 1st year? **1**
(ii) What is the production in the 10th year? **1**
(iii) What is the total production in first 7 years? **2**

7. Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize. While playing a treasure hunt game, some clues (numbers) are hidden in

various spots collectively forming an A.P. If the number on the nth spot is $20 + 4n$, then answer the following questions to help the players in spotting the clues :

[BOARD 2024]

(i) Which number is on first spot? **1**

(ii) Which spot is numbered as 112? **2**

OR

What is the sum of all the numbers on the first 10 spots? **2**

(iii) Which number is on the $(n-2)^{th}$ spot? **1**

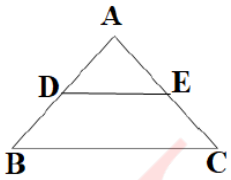
GRADE X

Question Bank (MATHEMATICS)

Chapter-6 Triangles

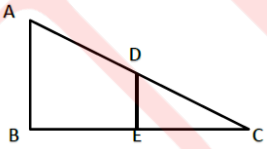
1 marks:

1. In the given figure, $DE \parallel BC, AE = a$ units, $EC = b$ units, $DE = x$ units and $BC = y$ units. Which of the following is true?



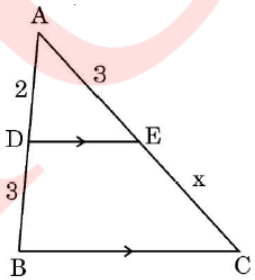
a) $x = \frac{a+b}{ay}$ b) $y = \frac{ax}{a+b}$ c) $x = \frac{ay}{a+b}$ d) $\frac{x}{y} = \frac{a}{b}$

2. In $\Delta ABC, DE \parallel AB$. If $AB = a, DE = x, BE = b, EC = c$ then express x in terms of a, b, c



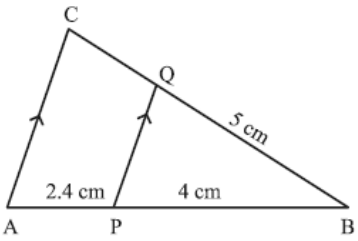
a) $\frac{ac}{b}$ b) $\frac{ac}{b+c}$ c) $\frac{ab}{c}$ d) $\frac{ab}{b+c}$

3. In the given figure, $DE \parallel BC$. The value of x is **[BOARD 2023]**



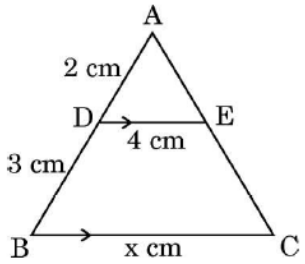
a) 2 cm b) 3 cm c) 5 cm d) $\frac{9}{2}$ cm

4. In the given figure, $PQ \parallel AC$. If $BP = 4\ cm,\ AP = 2.4\ cm, BQ = 5\ cm$ then find the length of BC. **[BOARD 2023]**



a) 8 cm b) 3 cm c) 0.3 cm d) $\frac{25}{3}\ cm$

5. In the given figure, $DE \parallel BC$. The value of x is **[BOARD 2023]**



a) 6 cm b) 12.5 cm c) 8 cm d) 10 cm

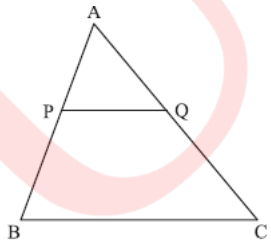
6. ABCD is a trapezium with $AD \parallel BC$ and $AD = 4\,cm$. If the diagonals AC and BD intersect each other at O such that $\frac{AO}{CO} = \frac{DO}{BO} = \frac{1}{2}$ then BC is **[COMPARTMENT 2023]**

a) 6 cm b) 7 cm c) 8 cm d) 9 cm

7. It is given that, $\Delta ABC \sim \Delta EDF$ such that $AB = 5\,cm, AC = 7\,cm, DF = 15\,cm$ and $DE = 12\,cm$ then the sum of the remaining sides of the triangles is

a) 23.05 cm b) 16.8 cm c) 6.25 cm d) 24 cm

8. In figure, $PQ \parallel BC$. Find the length of side AC, given that $PB = 6\,cm, AP = 4\,cm$ and $AQ = 8\,cm$. **[BOARD 2023]**

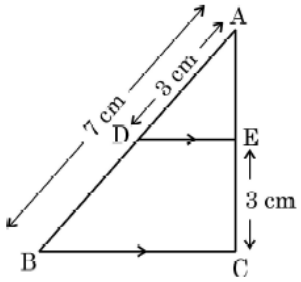


a) 12 cm b) 20 cm c) 6 cm d) 14 cm

9. If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar when **[BOARD 2023]**

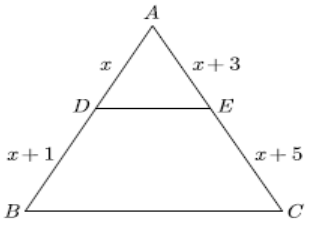
a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle D$ d) $\angle A = \angle F$

10. In the given figure, $DE \parallel BC$. If $AD = 3cm, AB = 7\,cm, EC = 3\,cm$ then length of AE is **[BOARD 2023]**



a) 2 cm b) 2.25 cm c) 3.5 cm d) 4 cm

11. In $\Delta ABC, DE \parallel BC$, find the value of x.



a) 3 b) 2 c) 1 d) 4

12. The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of the first triangle is 9 cm, then the corresponding side of second triangle is

a) 5.4 cm b) 5.2 cm c) 4.9 cm d) 5.1 cm

13. If $\Delta PRQ \sim \Delta XYZ$ then

a) $\frac{PR}{XZ} = \frac{RQ}{YZ}$ b) $\frac{PQ}{XY} = \frac{PR}{XZ}$ c) $\frac{PQ}{XZ} = \frac{QR}{YZ}$ d) $\frac{QR}{XZ} = \frac{PR}{XY}$

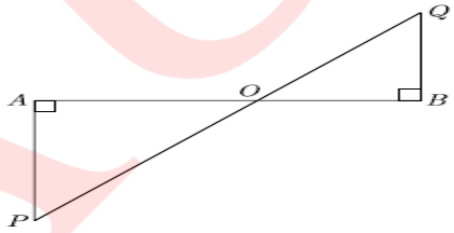
14. If $\Delta ABC \sim \Delta PQR$ with $\angle A = 32°$ and $\angle R = 65°$ then $\angle B$ is **[BOARD 2023]**

a) 32° b) 65° c) 83° d) 97°

15. If $\Delta ABC \sim \Delta DEF$ such that $2AB = DE$ and $BC = 8\,cm$ then find EF.

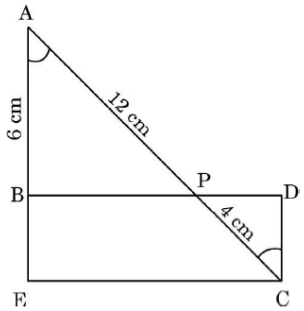
a) 16 cm b) 14 cm c) 12 cm d) 15 cm

16. In the given figure, if $\angle A = 90°, \angle B = 90°, OB = 4.5\,cm, OA = 6\,cm$ *and* $AP = 4\,cm$ then find QB.



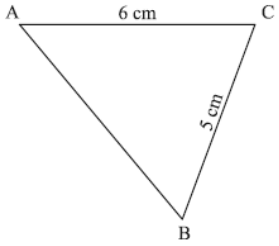
a) 3 cm b) 6 cm c) 4.5 cm d) 3.5 cm

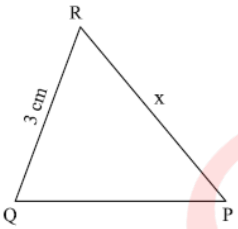
17. In the given figure, $\angle A = \angle C, AB = 6\,cm, AP = 12\,cm, CP = 4\,cm$. Then length of CD is **[BOARD 2023]**



a) 2 cm b) 6 cm c) 8 cm d) 18 cm

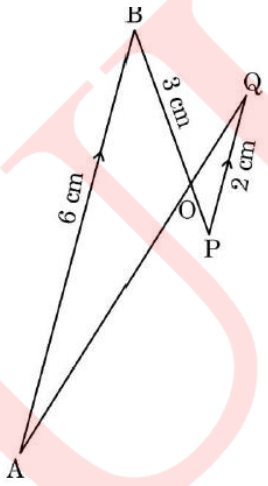
18. In the given figure, $\Delta ABC \sim \Delta QPR$. If $AC = 6\ cm, BC = 5\ cm,\ QR = 3\ cm\ and\ PR = x$ then the value of x is **[BOARD 2023]**





a) 3.6 cm b) 2.5 cm c) 10 cm d) 3.2 cm

19. In the given figure, $AB \parallel PQ$. If $AB = 6\ cm,\ PQ = 2\ cm,\ OB = 3\ cm$ then length of OP is **[BOARD 2023]**

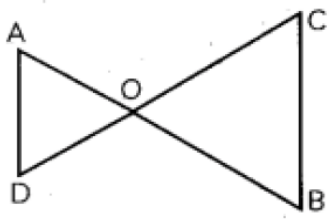


a) 9 cm b) 3 cm c) 4 cm d) 1 cm

20. The area of right angled triangle is 40 cm^2 and its perimeter is 40 cm. The length of its hypotenuse is

a) 16 cm b) 18 cm c) 17 cm d) 19 cm

21. In the figure, if $\frac{OA}{OD} = \frac{OC}{OB}$ then which pair of angles are equal?



a) $\angle A = \angle C, \angle B = \angle D$

b) $\angle C = \angle B, \angle A = \angle D$

c) $\angle A = \angle B, \angle C = \angle D$

d) None of these

22. In ΔABC and $\Delta DEF, \angle B = \angle E, \angle F = \angle C$ *and* $AB = 3DE$. Then the two triangles are

a) Congruent but not similar
c) similar but not congruent
b) Neither congruent nor similar
d) congruent as well as similar

23. $\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of ΔABC *and* ΔPQR respectively and $AB^2 : PQ^2 = 4:9$ then $AM : PN$ is

a) 16: 81 b) 4: 9 c) 3: 2 d) 2: 3

24. In the ΔABC, D and E are points on side AB and AC respectively such that $DE \parallel BC$. If $AE = 2\ cm, AD = 3\ cm, BD = 4.5\ cm$ then CE equals

a) 1 cm b) 2 cm c) 3 cm d) 4cm

25. ΔABC is such that $AB = 3cm, BC = 2\ cm, CA = 2.5\ cm$. *If* $\Delta ABC \sim \Delta DEF$ *and* $EF = 4\ cm$ then perimeter of ΔDEF

a) 7.5 cm b) 15 cm c) 22.5 cm d) 30 cm

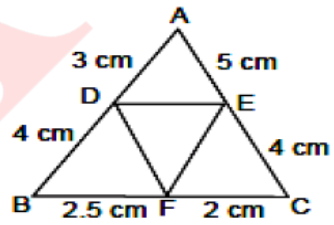
26. If $\Delta ABC \sim \Delta PQR$, $PQ = 6\ cm, AB = 8\ cm$ and perimeter of ΔABC is 36 cm then perimeter of ΔPQR is **[BOARD 2023]**

a) 20.25 cm b) 27 cm c) 48 cm d) 64 cm

27. If $\Delta ABC \sim \Delta EDF$ and ΔABC is not similar to ΔDEF then which of the following is not true?

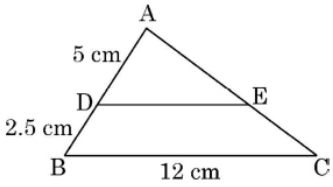
a) $BC.EF = AC.FD$
c) $AB.EF = AC.DE$
b) $BC.DE = AB.EF$
d) $BC.DE = AB.FD$

28. In the given figure, $AD = 3\ cm, AE = 5\ cm, BD = 4\ cm, CF = 2\ cm, CE = 4\ cm, BF = 2.5\ cm$ then



a) $DE \parallel BC$ b) $DF \parallel AC$ c) $EF \parallel AB$ d) none of these

29. In the given figure ΔABC is shown. $DE \parallel BC$, $AD = 5\ cm, DB = 2.5\ cm, BC = 12\ cm$ then DE is **[BOARD 2024]**



a) 10 cm b) 6 cm c) 8 cm d) 7.5 cm

30. The perimeters of two similar triangles ABC & PQR are 56 cm and 48 cm respectively. $\frac{PQ}{AB}$ is **[BOARD 2024]**

a) $\frac{7}{8}$ b) $\frac{6}{7}$ c) $\frac{7}{6}$ d) $\frac{8}{7}$

31. If the diagonals of a quadrilateral divide each other proportionally then it is a **[BOARD 2024]**

a) Parallelogram b) rectangle c) square d) trapezium

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

32. ***Assertion(A):*** In the $\Delta ABC, AB = 24\ cm, BC = 10\ cm\ and\ AC = 26\ cm$ then ΔABC is a right angle triangle.

Reason(R): If in two triangles, their corresponding angles are equal then the triangles are similar.

33. ***Assertion(A):*** If the co-ordinates of the mid-points of the sides AB and AC of ΔABC are $D(3,5)$ and $E(-3,-3)$ respectively then $BC = 20$ units

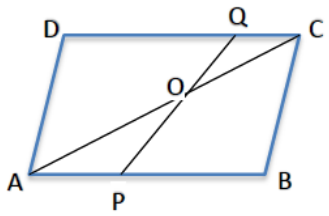
Reason(R): The line joining the mid-points of two sides of a triangle is parallel to the third side and equal to half of it.

34. ***Assertion(A):*** ABCD is a trapezium with $DC \parallel AB$. E and F are points on AD and BC respectively such that $EF \parallel AB$. Then $\frac{AE}{ED} = \frac{BF}{FC}$.

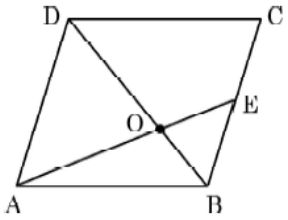
Reason(R): Any line parallel to parallel sides of a trapezium divides the non-parallel sides proportionally. **[BOARD 2024]**

2 marks:

1. ABCD is a parallelogram. Point P divides AB in the ratio 2:3 and point Q divides DC in the ratio 4:1. Prove that OC is half of OA.



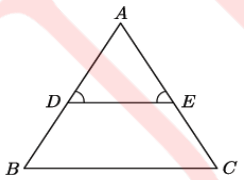
2. ABCD is a parallelogram. AE divides the line segment BD in the ratio 1:2. If $BE = 1.5\,cm$ then find the length of BC. **[BOARD 2023]**



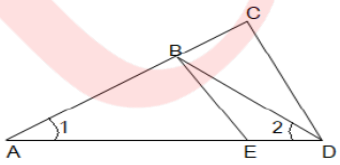
3. ABCD is a trapezium with $AB \parallel CD$ and its diagonals AC and BD intersect each other at O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$. **[BOARD 2023]**

4. In a rectangle ABCD, E is a point on AB such that $AE = \frac{2}{3}AB$. If $AB = 6\,km$ and $AD = 3\,km$, then find DE.

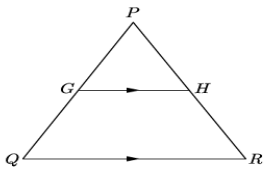
5. In figure, $\angle D = \angle E$ and $\frac{AD}{DB} = \frac{AE}{EC}$ prove that ΔBAC is an isosceles triangle.



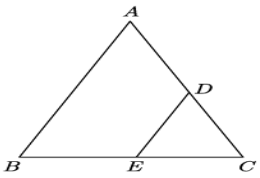
6. In the given figure, $\frac{AD}{AE} = \frac{AC}{BD}$ and $\angle 1 = \angle 2$. Show that $\Delta BAE \sim \Delta CAD$.



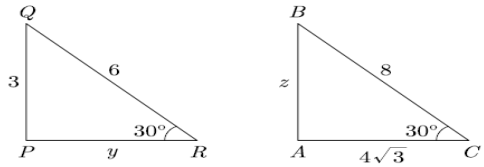
7. In the given figure, G is the mid-point of the side PQ of ΔPQR and $GH \parallel QR$. Prove that H is the mid-point of the side PR.



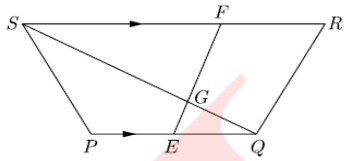
8. In the given figure, $\Delta ABC, DE \parallel AB$. If $AD = 2x, DC = x + 3, BE = 2x - 1$ and $CE = x$ then find the value of x.



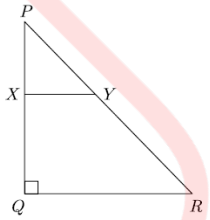
9. In the given figure, $\Delta ABC \sim \Delta PQR$ find the value $y + z$.



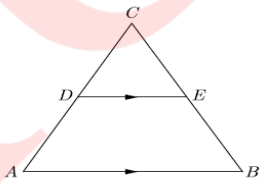
10. In the given figure, PQRS is a trapezium in which $PQ \parallel RS$. On PQ and RS there are points E and F respectively such that EF intersects SQ at G. Prove that $EQ \times GS = GQ \times FS$.



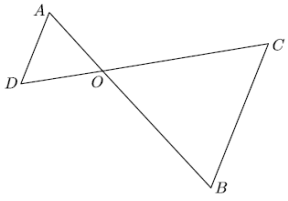
11. In the given figure, PQR is a triangle right angled at Q and $XY \parallel QR$. If $PQ = 6\,cm, PY = 4\,cm$ and $PX : XQ = 1 : 2$. Calculate the length of PR and QR.



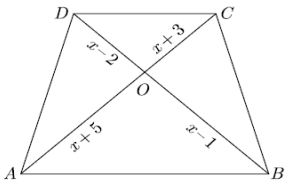
12. In the given figure, $\angle A = \angle B$ and $AD = BE$. Show that $DE \parallel AB$.



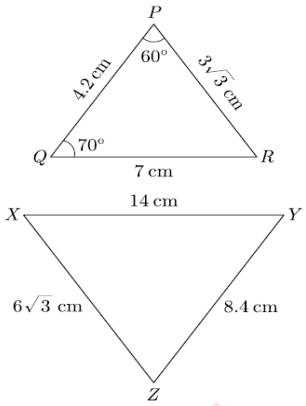
13. In the given figure, $OA \times OB = OC \times OD$ show that $\angle A = \angle C$ and $\angle B = \angle D$.



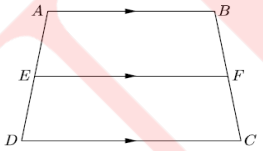
14. In the given figure, if $AB \parallel DC$, find the value of x.



15. In the given figure, find the measure of $\angle X$.

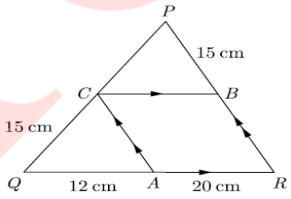


16. In the given figure, if ABCD is a trapezium in which $AB \parallel CD \parallel EF$ then prove that $\frac{AE}{ED} = \frac{BF}{FC}$.



17. ABC is a right triangle right angled at C. Let $BC = a, CA = b, AB = c$ *and* p be the length of perpendicular from C to AB. Prove that $cp = ab$.

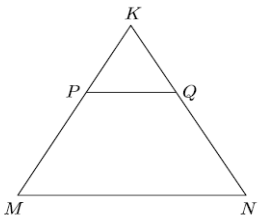
18. In the given figure, $CB \parallel QR$ and $CA \parallel PR$. If $AQ = 12\ cm, AR = 20\ cm, PB = CQ = 15\ cm$, calculate PC and BR.



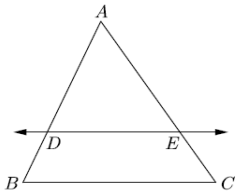
19. In ΔABC, if X and Y are points on AB and AC respectively such that $\frac{AX}{XB} = \frac{3}{4}, AY = 5$ *and* $YC = 9$ then state whether XY and BC are parallel or not.

20. If $\Delta ABC \sim \Delta DEF$ such that $2AB = DE$ and $BC = 8\ cm$ then find EF.

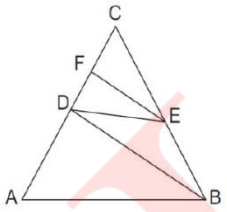
21. In the figure, PQ is parallel to MN, if $\frac{KP}{PM} = \frac{4}{13}$ and $KN = 20.4\ cm$ then find KQ.



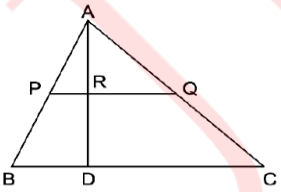
22. In the given figure, in ΔABC, $DE \parallel BC$ such that $AD = 2.4\,cm$, $AB = 3.2\,cm$ and $AC = 8\,cm$, then what is the length of AE?



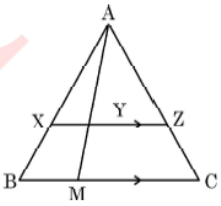
23. In the given figure, $AB \parallel DE$ *and* $BD \parallel EF$ then prove that $DC^2 = CF \times AC$.



24. In the given figure, $AP = 3cm, AR = 4.5\,cm, AQ = 6\,cm, AB = 5\,cm, AC = 10\,cm$. Find the length of AD

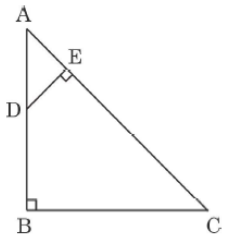


25. In the given figure, $Z \parallel BC$. $AZ = 3\,cm$, $ZC = 2cm$, $BM = 3\,cm, MC = 5\,cm$. Find the length of XY. **[BOARD 2023]**



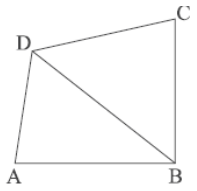
26. In the given figure, $AB \perp BC, DE \perp AC$. Prove that $\Delta ABC \sim \Delta AED$.

[COMPARTMENT 2023]



27. X is a point on the side BC of ΔABC. XM and XN are drawn parallel to AB and AC respectively meeting AB in N and AC in M. MN produced meets CB produced at T. Prove that $TX^2 = TB \times TC$.

28. In the given figure, ABCD is a quadrilateral. Diagonal BD bisects $\angle B$ & $\angle D$ both. Prove that **[BOARD 2024]**

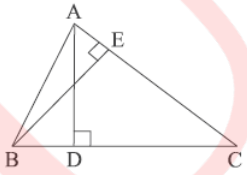


(i) $\Delta ABD \sim \Delta CBD$

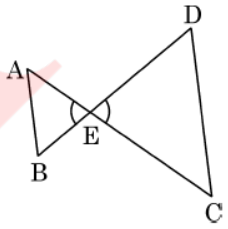
(ii) $AB = BC$.

29. Diagonals AC & BD of a trapezium ABCD intersect at O, where $AB \parallel DC$. If $\frac{DO}{BO} = \frac{1}{2}$ then show that $AB = 2\,CD$. **[BOARD 2024]**

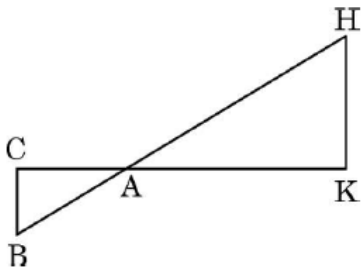
30. In ΔABC, altitudes AD and BE are drawn. If $AD = 7\ cm, BE = 9\ cm, EC = 12\ cm$ then find the length of CD. **[BOARD 2024]**



31. In the given figure, $\frac{EA}{EC} = \frac{EB}{ED}$ prove that $\Delta EAB \sim \Delta ECD$. **[BOARD 2024]**

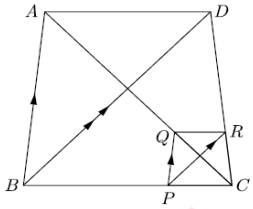


32. In the given figure, $\Delta AHK \sim \Delta ABC$. If $AK = 8\ cm, BC = 3.2\ cm, HK = 6.4\ cm$ then find the length of AC. **[BOARD 2024]**

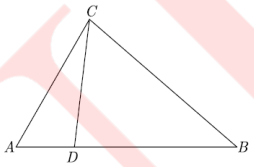


3 marks:

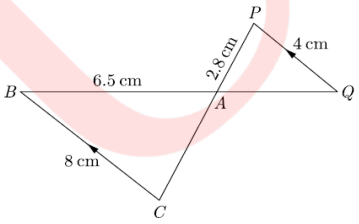
1. Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times DP$.
2. In the given figure, two triangles ABC and DBC lie on the same side of BC such that $PQ \parallel BA$ and $PR \parallel BD$. Prove that $QR \parallel AD$.



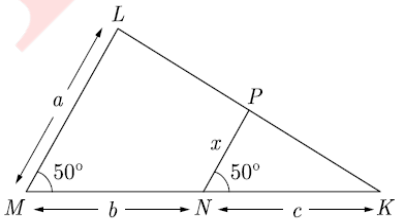
3. In the given figure, if $\angle ACB = \angle CDA$, $AC = 6\ cm$ and $AD = 3\ cm$ then find the length of AB.



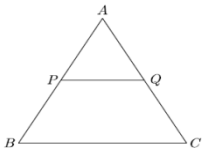
4. In the given figure, $BC \parallel PQ$ and $BC = 8\ cm$, $PQ = 4\ cm, BA = 6.5\ cm, AP = 2.8\ cm$. Find CA and AQ.



5. In the given figure, find the value of x in terms of a, b and c.

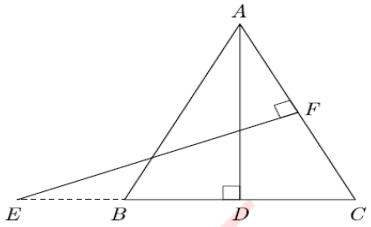


6. In the given figure, P and Q are the points on the sides AB and AC respectively of ΔABC such that $AP = 3.5\ cm$, $PB = 7\ cm, AQ = 3\ cm$ and $QC = 6\ cm$. If $PQ = 4.5\ cm$ find BC.

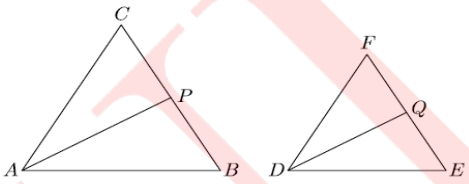


7. Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times DP$.
8. In the given figure, $AB = AC$. E is a point on CB produced. If AD is perpendicular to BC and EF perpendicular to AC prove that $\Delta ABD \sim \Delta CEF$.

[BOARD 2023 & COMPARTMENT 2023]



9. In the given figure, $\Delta ABC \sim \Delta DEF$. AP bisects $\angle CAB$ and DQ bisects $\angle FDE$.

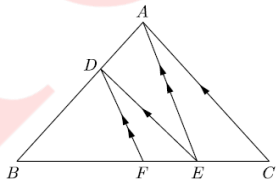


Prove that:

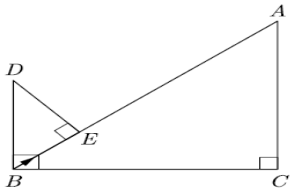
(i) $\frac{AP}{DQ} = \frac{AB}{DE}$

(ii) $\Delta CAP \sim \Delta FDQ$.

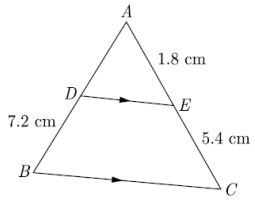
10. In the given figure, $DE \parallel AC$ and $DF \parallel AE$. Prove that $\frac{BE}{FE} = \frac{BE}{EC}$.



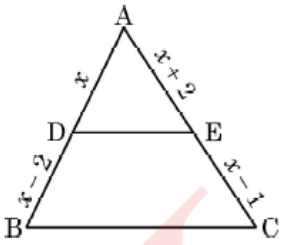
11. In the given figure, $DB \perp BC, DE \perp AB$ and $AC \perp BC$. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$



12. A 6m high tree cast a 4 m long shadow. At the same time, a flag pole cast a shadow 50 m long. How long is the flag pole?
13. In the given figure, $DE \parallel BC$. Find the length of side AD, given that $AE = 1.8\,cm, BD = 7.2\,cm$ and $CE = 5.4\,cm$



14. In $\Delta ABC, DE \parallel BC$, find the value of x. **[BOARD 2023]**



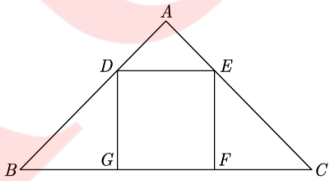
5 marks:

1. Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.

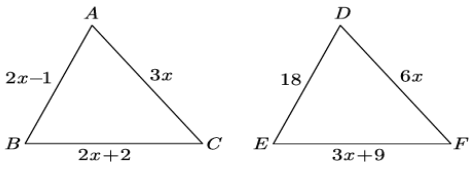
[BOARD 2023, COMPARTMENT 2023 & BOARD 2024]

Using the above theorem prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the non parallel sides in the same ratio.

2. In the given figure, DEFG is a square and $\angle BAC = 90°$. Show that $FG^2 = BG \times FC$.



3. In the given figure, if $\Delta ABC \sim \Delta DEF$ and their sides of lengths (in cm) are marked along them, then find the lengths of sides of each triangle.

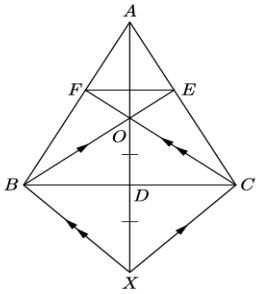


4. In $\Delta ABC, AD$ is a median and O is any point on AD. BO and CO on producing meet AC and AB at E and F respectively. Now AD is produced to X such that $OD = DX$ as shown in figure.

Prove that

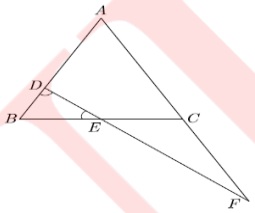
(i) $EF \parallel BC$

(ii) $AO : AX = AF : AB$

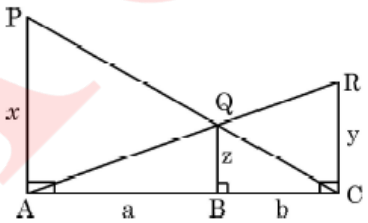


5. In the given figure, $\angle BED = \angle BDE$ and E is the mid-point of BC. Prove that $\frac{AF}{CF} = \frac{AD}{BE}$.

[BOARD 2023]

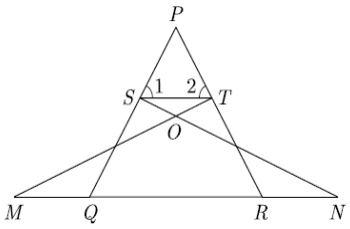


6. In $\Delta ABC, AD$ is the median to BC and in $\Delta PQR, PM$ is the median to QR. If $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$. Prove that $\Delta\, ABC \sim \Delta\, PQR$.
7. PA, QB and RC are each perpendicular to AC. If $AP = x, QB = z,\ RC = y,$ $AB = a\ and\ BC = b$ then prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$. **[BOARD 2023 & BOARD 2024]**



8. Sides AB and AC and median AM of a triangle ABC are respectively proportional to sides DE and DF and median DN of another triangle DEF. Show that $\Delta\, ABC \sim \Delta\, DEF$. **[BOARD 2023 & BOARD 2024]**
9. Find the length of the second diagonal of a rhombus, whose side is 5 cm and one of the diagonal is 6 cm.
10. In the given figure, $\angle 1 = \angle 2$ and $\Delta\, NSQ \sim \Delta\, MTR$ then prove that $\Delta\, PTS \sim \Delta\, PRO$.

[BOARD 2024]

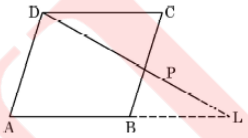


11. ABCD is a parallelogram, P is a point on side BC and DP when produced meets AB produced at L. Prove that

(i) $\frac{DP}{PL} = \frac{DC}{BL}$

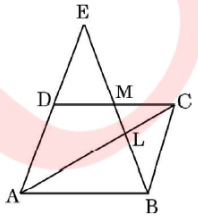
(ii) $\frac{DL}{DP} = \frac{AL}{DC}$

(iii) If $LP : PD = 2 : 3$ then find $BP : BC$. **[BOARD 2023]**



12. Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD (produced) in E. Prove that $EL = 2\,BL$.

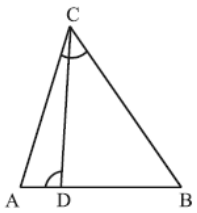
[BOARD 2023 & BOARD 2024]



13. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$ then prove that $CA^2 = CB.CD$. **[BOARD 2023]**

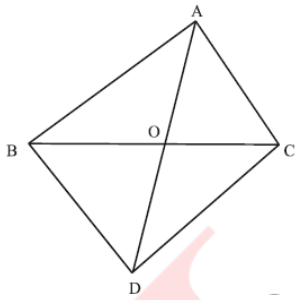
14. If AD and PM are medians of triangles ABC and PQR respectively, where $\Delta ABC \sim \Delta PQR$ then prove that $\frac{AB}{PQ} = \frac{AD}{PM}$. **[BOARD 2023]**

15. In the given figure, $\angle ADC = \angle BCA$ prove that $\Delta ACB \sim \Delta ADC$. Hence find BD if $AC = 8\,cm$ & $AD = 3cm$. **[BOARD 2023]**

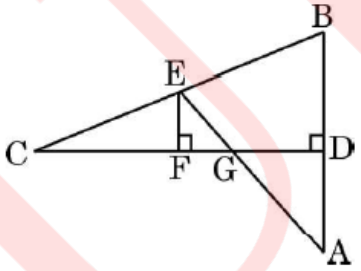


16. In a ΔPQR, N is a point on PR such that $QN \perp PR$. If $PN \times NR = QN^2$ then prove that $\angle PQR = 90°$. **[BOARD 2023 & BOARD 2024]**

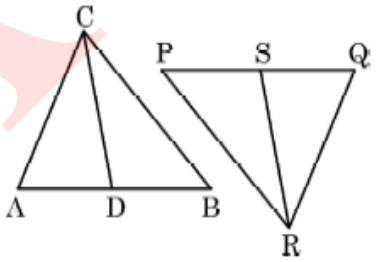
17. In the given figure, ΔABC and ΔDBC are on the same base BC. If AD intersects BC at O prove that $\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$. **[BOARD 2023]**



18. In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that $\frac{CF}{CD} = \frac{FG}{DG}$. **[BOARD 2023]**



19. In the given figure, CD and RS are respectively the medians of ΔABC & ΔPQR. If $\Delta ABC \sim \Delta PQR$ then prove that



(i) $\Delta ADC \sim \Delta PSR$.

(ii) $AD \times PR = AC \times PS$. **[BOARD 2023]**

20. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$. **[BOARD 2024]**

GRADE X

Question Bank (MATHEMATICS)

Chapter-7 Co-ordinate Geometry

1 marks:

1. If the distance between the points $A(4,p)$ *and* $B(1,0)$ is 5 units then the value(s) of p is(are)

   a) 4 only b) -4 only c) ± 4 d) 0

2. The distance between the points $(a\cos\theta + b\sin\theta, 0)$ and $(0, a\sin\theta - b\cos\theta)$ is

   a) a^2+b^2 b) a^2-b^2 c) $\sqrt{a^2+b^2}$ d) $\sqrt{a^2-b^2}$

3. The point P on x-axis equidistant from the points $A(-1,0), B(5,0)$ is

   a) $(2,0)$ b) $(0,2)$ c) $(3,0)$ d) $(-3,5)$

4. The point on x-axis which is equidistant from the points $A(-2,3), B(5,4)$ is

   a) $(0,2)$ b) $(2,0)$ c) $(3,0)$ d) $(-2,0)$

5. If the points $A(4,3)$ *and* $B(x,5)$ are on the circle with centre $O(2,3)$ then the value of x is

   a) 0 b) 1 c) 2 d) 3

6. If points $A(-3,12), B(7,6), C(x,9)$ are collinear then the value of x is

   a) 2 b) 3 c) 4 d) 5

7. The point which divides the line segment joining the points $(8,-9)$*and* $(2,3)$ in the ratio 1: 2 internally lies in the

   a) I quadrant b) II quadrant c) III quadrant d) IV quadrant

8. The coordinate of the point dividing the line segment joining the points $A(1,3), B(4,6)$ in the ratio 2: 1 is

   a) $(5,3)$ b) $(3,5)$ c) $(4,6)$ d) $(6,4)$

9. The line segment joining the points A(5, 3), B(-3, 11) is divided by the point C(3, 5) in the ratio

   a) 1: 3 b) 3:1 c) 2: 3 d) 3: 2

10. If the point $P(6,2)$ divides the line segment joining $A(6,5)$ *and* $B(4,y)$ in the ratio 3: 1 then the value of y is

    a) 1 b) 2 c) 3 d) 4

11. The ratio in which the point $(2, y)$ divides the join of $(-4, 3)$ *and* $(6, 3)$ hence the value of y is

a) $2:3, y = 3$ b) $3:2, y = 4$ c) $3:2, y = 3$ d) $3:2, y = 2$

12. If the point $P(k, 0)$ divides the line segment joining the points $A(2, -2), B(-7, 4)$ in the ratio $1:2$ then the value of k is

a) 1 b) 2 c) -1 d) -2

13. If the point $C(k, 4)$ divides the line segment joining two points $A(2, 6), B(5, 1)$ in ratio 2: 3 then the value of k is

a) $\frac{5}{16}$ b) $\frac{16}{5}$ c) $\frac{9}{5}$ d) $\frac{5}{9}$

14. C is the mid-point of PQ, if $P(4, x), C(y, -1), Q(-2, 4)$ then x and y respectively are

a) -6 and 1 b) -6 and 2 c) 6 and -1 d) 6 and -2

15. If $A\left(\frac{m}{3}, 5\right)$ is the mid-point of the line segment joining the points $Q(-6, 7), R(-2, 3)$ then the value of m is

a) -12 b) -4 c) 12 d) -6

16. If the centre of a circle is $(3, 5)$ and end points of a diameter are $(4, 7)$ *and* $(2, y)$ then the value of y is

a) 3 b) -3 c) 7 d) 4

17. If the mid-point of the line segment joining the points $A(3, 4)$, $B(k, 6)$ is $P(x, y)$ and $x + y - 10 = 0$ the value of k will be

a) 4 b) 5 c) 6 d) 7

18. Points $A(3, 1), B(5, 1), C(a, b)$ *and* $D(4, 3)$ are vertices of a parallelogram. The values of a and b are

a) 6 and 3 b) 2 and 1 c) 4 and 2 d) none of these

19. The co-ordinates of the point which is reflection of point $(-3, 5)$ in x-axis are

a) $(3, 5)$ b) $(3, -5)$ c) $(-3, -5)$ d) $(-3, 5)$

20. The centroid of the triangle whose vertices are $(3, -7), (-8, 6)$ and $(5, 10)$ is

a) $(0, 9)$ b) $(0, 3)$ c) $(1, 3)$ d) $(3, 5)$

21. If $x - 2y + k = 0$ is a median of the triangle whose vertices are at points $A(-1, 3), B(0, 4), C(-5, 2)$ then the value of k is

a) 2 b) 4 c) 6 d) 8

22. The coordinates of a point A on y-axis at a distance of 4 units from x-axis and below it are

a) $(4, 0)$ b) $(0, 4)$ c) $(-4, 0)$ d) $(0, -4)$

23. In what ratio, does x-axis divide the line segment joining the points $A(3,6), B(-12,-3)$? **[BOARD 2023]**

a) 1:2 b) 1:4 c) 4:1 d) 2:1

24. The distance between the points $(0, 2\sqrt{5})$ & $(-2\sqrt{5}, 0)$ is **[BOARD 2023]**

a) $2\sqrt{10}$ units b) $4\sqrt{10}$ units c) $2\sqrt{20}$ units d) 0

25. The distance between the points $P\left(-\frac{11}{3}, 5\right), Q\left(-\frac{2}{3}, 5\right)$ is **[BOARD 2023]**

a) 6 units b) 4 units c) 2 units d) 3 units

26. The end points of a diameter of a circle are $(2,4), (-3,-1)$. The radius of the circle is **[BOARD 2023]**

a) $2\sqrt{5}$ b) $\frac{5}{2}\sqrt{5}$ c) $\frac{5}{2}\sqrt{2}$ d) $5\sqrt{2}$

27. The coordinates of the vertex A of a rectangle ABCD whose three vertices are given as $B(0,0), C(3,0)$ & $D(0,4)$ are **[BOARD 2023]**

a) $(4,0)$ b) $(0,3)$ c) $(3,4)$ d) $(4,3)$

28. The distance of the point $(-1,7)$ from x-axis is **[BOARD 2023]**

a) -1 b) 7 c) 6 d) $\sqrt{50}$

29. The distance of the point $(-6,8)$ from origin is **[BOARD 2023]**

a) 6 b) -6 c) 8 d) 10

30. The points $(-4,0), (4,0), (0,3)$ are the vertices of a **[BOARD 2023]**

a) Right triangle b) isosceles c) equilateral d) scalene

31. The point of intersection of the line represented by $3x - y = 3$ and y-axis is given by **[BOARD 2023]**

a) $(0,-3)$ b) $(0,3)$ c) $(2,0)$ d) $(-2,0)$

32. The coordinates of the point where the line $2y = 4x + 5$ crosses x-axis is **[BOARD 2023]**

a) $\left(0, -\frac{5}{4}\right)$ b) $\left(0, \frac{5}{2}\right)$ c) $\left(-\frac{5}{4}, 0\right)$ d) $\left(-\frac{5}{2}, 0\right)$

33. If AB is a chord of a circle with centre at $O(2,3)$, where the coordinates of A and B are $(4,3), (x,5)$ respectively, then the value of x is **[BOARD 2023]**

a) 2 b) 3 c) 4 d) 5

34. AD is a median of ΔABC with vertices $A(5,-6), B(6,4)$ & $C(0,0)$ length of AD is **[BOARD 2024]**

a) $\sqrt{68}$ *units* b) $2\sqrt{15}$ *units* c) $\sqrt{101}$ *units* d) 10 units

35. The centre of a circle is at $(2,0)$. If one end of a diameter is at $(6,0)$ then the other end is at **[BOARD 2024]**

a) $(0,0)$ b) $(4,0)$ c) $(-2,0)$ d) $(-6,0)$

36. If the distance between the points $(3,-5)$ and $(x,-5)$ is 15 units, then the values of x are **[BOARD 2024]**

a) 12, -18 b) -12, 18 c) 18, 5 d) -9, -12

37. Point P divides the line segment joining the points $A(4,-5)$ & $B(1,2)$ in the ratio 5:2. Co-ordinates of P are **[BOARD 2024]**

a) $\left(\frac{5}{2},\frac{-3}{2}\right)$ b) $\left(\frac{11}{7},0\right)$ c) $\left(\frac{13}{7},0\right)$ d) $\left(0,\frac{13}{7}\right)$

38. XOYZ is a rectangle with vertices $X(-3,0), O(0,0), Y(0,4)$& $Z(x,y)$. The length of its each diagonal is **[BOARD 2024]**

a) 5 units b) $\sqrt{5}$ units c) x^2+y^2 units d) 4 units

39. The distance between the points $(a\cos\theta, -a\sin\theta)$ and $(a\sin\theta, a\cos\theta)$ is **[BOARD 2024]**

a) a b) $a\sqrt{2}$ c) 0 d) 2a

40. If the vertices of the parallelogram PQRS taken in order are $P(3,4), Q(-2,3)$ *and* $R(-3,-2)$ then the co-ordinates of its fourth vertex S are **[BOARD 2024]**

a) $(-2,-1)$ b) $(-2,-3)$ c) $(2,-1)$ d) $(1,2)$

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

a) Assertion (A) is false but reason (R) is true

41. ***Assertion (A):*** The value of y is 6, for which the distance between the points $P(2,-3)$ *and* $Q(10,y)$ is 10.

Reason (R): Distance between two given points $A(x_1,y_1)$*and* $B(x_2,y_2)$ is given $AB = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$.

42. ***Assertion (A):*** The point $(-1,6)$ divides the line segment joining the points $(-3,10)$ *and* $(6,-8)$ in the ratio 2: 7 internally.

Reason (R): Given three points A, B and C form an equilateral triangle then $AB = BC = AC$.

43. ***Assertion (A):*** The point $(0, 4)$ lies on y-axis.

    Reason (R): The x coordinate on the point on y-axis is zero.

44. ***Assertion (A):*** The point $(3, 0)$ lies on x-axis.

    Reason (R): The x coordinate on the point on y-axis is zero.

45. ***Assertion (A):*** Point $P(0, 2)$ is the point of intersection of y-axis with the line $3x + 2y = 4$.

    Reason (R): The distance of point $P(0, 2)$ from x-axis is 2 units. **[BOARD 2023]**

46. ***Assertion (A):*** If the points $A(4, 3), B(x, 5)$ lie on a circle with centre $O(2, 3)$ then the value of x is 2.

    Reason (R): Centre of a circle is the mid-point of each chord of the circle.

    [BOARD 2023]

47. ***Assertion (A):*** The point which divides the line segment joining the points $A(1, 2)$ & $B(-1, 1)$ internally in the ratio 1:2 is $\left(\frac{-1}{3}, \frac{5}{3}\right)$.

    Reason (R): The coordinates of the point which divides the line segment joining the points $A(x_1, y_1)$ & $B(x_2, y_2)$ in the ratio $m_1 : m_2$ are $\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$.

    [BOARD 2024]

48. ***Assertion (A):*** Mid-point of a line segment divides the line segment in the ratio 1:1.

    Reason (R): The ratio in which the point $(-3, k)$ divides the line segment joining the points $(-5, 4)$ & $(-2, 3)$ is 1:2. **[BOARD 2024]**

2 marks:

1. What is the distance of the point $P(3, 4)$ from x-axis?
2. The ordinate of a point A on y-axis is 5 and B has coordinates $(-3, 1)$. Find the length of AB?
3. If the distance between the points $A(4, p), B(1, 0)$ is 5 units then what are the values of p?
4. If $A(5, 2), B(2, -2) and\ C(-2, t)$ are the vertices of a right angled triangle with $\angle B = 90°$ then find the value of t.
5. If three points $(0,0), \left(3, \sqrt{3}\right) and\ (3, \lambda)$ form an equilateral triangle, then what is the value of λ?
6. Find the coordinate of the point dividing the line segment joining the points $A(1, 3)\ and\ B(4, 6)$ in the ratio 2: 1?

7. The x coordinate of a point P is twice its y coordinate. If P is equidistant from $Q(2,-5), R(-3,6)$, find the coordinates of P.
8. If the point $P(x,y)$ is equidistant from the points $Q(a+b,b-a), R(a-b,a+b)$ then prove that $bx = ay$.
9. Find the ratio in which the point $P\left(\frac{3}{4},\frac{5}{12}\right)$ divides the line segment joining the points $A\left(\frac{1}{2},\frac{3}{2}\right)$ *and* $(2,-5)$.
10. If $A\left(\frac{m}{3},5\right)$ is the mid-point of the line segment joining the points $Q(-6,7), R(-2,3)$ then what is the value of m?
11. The mid-point of the line segment AB is $P(0,4)$, if the coordinates of B are $(-2,3)$ then find the coordinates of A.
12. If the points $A(4,3), B(x,5)$ are on the circle with centre $O(2,3)$ then what is the value of x?
13. If the centre of a circle is $(3,5)$ and end points of a diameter are $(4,7)$ *and* $(2,y)$. What is the value of y?
14. Show that the points $(-2,3),(8,3),(6,7)$ are the vertices of a right angled triangle.

[BOARD 2023]

15. Show that the points $(-3,-3),(3,3),\left(-3\sqrt{3},3\sqrt{3}\right)$ are the vertices of an equilateral triangle. **[BOARD 2023]**
16. Prove that $A(4,3), B(6,4), C(5,6),\ D(3,5)$ are the vertices of a square. **[BOARD 2023]**
17. Show that $A(0,-1), B(6,7), C(-2,3), D(8,3)$ are the vertices of a rectangle ABCD.

[BOARD 2023]

18. Show that the points $A(6,4), B(5,-2), C(7,-2)$ are the vertices of an isosceles triangle. Also, find the length of the median through point A. **[BOARD 2023]**
19. The line segment joining the points $A(4,-5), B(4,5)$ is divided by the point P such that $AP:AB = 2:5$. Find the coordinates of P. **[BOARD 2023]**
20. The point $P(x,y)$ is equidistant from points $A(5,1), B(1,5)$. Prove that $x = y$.

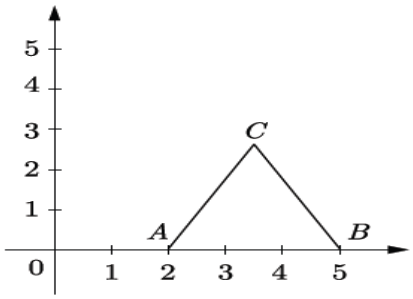
[BOARD 2023]

21. Find the ratio in which y-axis divides the line segment joining the points $(5,-6),(-1,-4)$. **[BOARD 2023]**
22. Find the ratio in which line $y = x$ divides the line segment joining the points $(6,-3),(1,6)$. **[BOARD 2023 & BOARD 2024]**

23. A line intersects y-axis and x-axis at point P and Q respectively. If $R(2,5)$ is the mid-point of line segment PQ, then find the coordinates of P and Q. **[BOARD 2023]**
24. Find the points on the x-axis, each of which is at a distance of 10 units from the point $A(11,-8)$. **[BOARD 2023]**
25. Find the ratio in which the point $(-1,k)$ divides the line segment joining the points $(-3,10),(6,-8)$. Also find the value of k. **[BOARD 2023]**
26. If $A(-2,-1),B(a,0),\ C(4,b),D(1,2)$ are the vertices of a parallelogram ABCD then find the values of a and b. **[BOARD 2023]**
27. The three vertices of a parallelogram ABCD taken in order, are $A(-1,0),B(3,1),$ $C(2,2)$. Find the coordinates of the fourth vertex D. **[BOARD 2023]**
28. Find the type of triangle ABC formed whose vertices are $A(1,0),B(-5,0)$ & $C(-2,5)$. **[BOARD 2024]**
29. $A(3,0),B(6,4),C(-1,3)$ are vertices of a triangle ABC. Find length of its median BE. **[BOARD 2024]**
30. Find a relation between x and y such that the point $P(x,y)$ is equidistant from the points $A(7,1) and\ B(3,5)$. **[BOARD 2024]**
31. Points $A(-1,y)$ & $B(5,7)$ lie on a circle $O(2,-3y)$ such that AB is a diameter of the circle. Find the value of y. Also, find the radius of the circle. **[BOARD 2024]**

3 marks:

1. If the distance of $P(x,y)$ from $A(6,2) and\ B(-2,6)$ are equal. Prove that $y=2x$.
2. Show that $A(-1,0),B(3,1),C(2,2)\ and\ D(-2,1)$ are the vertices of a parallelogram.
3. Prove that the diagonals of a rectangle ABCD with vertices $A(2,-1),B(5,-1),C(5,6)$ and $D(2,6)$ are equal and bisect each other.
4. In the given figure, ΔABC is an equilateral triangle of side 3 units. Find the co-ordinates of the other two vertices.



5. Find the ratio in which $P(4, m)$ divides the segment joining the points $A(2, 3) and\ B(6, -3)$. Hence find m.
6. Find the ratio in which the line $2x + 3y - 5 = 0$ divides the line segment joining the points $(8, -9) and\ (2, 1)$. Also find the coordinates of the point of division.
7. If the point $C(-1, 2)$ divides internally the line segment joining the points $A(2, 5), B(x, y)$ in the ratio 3: 4. Find the coordinates of B.
8. If the point $C(-1, 2)$ divides internally the line segment joining the points $A(2, 5), B(x, y)$ in the ratio 3: 4 then find the value of $x^2 + y^2$.
9. If the co-ordinates of points A and B are $(-2, -2) and\ (2, -4)$ respectively. Find the coordinates of P such that $AP = \frac{3}{7}AB$ where P lies on the line segment AB.
10. Find the coordinates of the points of trisection of the line segment joining the points $A(1, -2) and\ B(-3, 4)$.
11. The vertices of ΔABC are $A(6, -2), B(0, -6), C(4, 8)$. Find the co-ordinates of mid-points of AB, BC and AC.
12. If (a, b) is the mid-point of the line segment joining the points $A(10, -6) and\ B(k, 4)$ and $a - 2b = 18$ then find the value of k and the distance AB.
13. The coordinates of the vertices of ΔABC are $A(7, 2), B(9, 10)\ and\ C(1, 4)$. If E and F are the mid-points of AB and AC respectively. Prove that $EF = \frac{1}{2}BC$.
14. If $(-5, 3)$ & $(5, 3)$ are two vertices of an equilateral triangle then find co-ordinates of the third vertex given that origin lies inside the triangle. $(Use\ \sqrt{3} = 1.7)$

[BOARD 2023]

15. The centre of a circle is $(2a, a - 7)$. Find the values of 'a' if the circle passes through the point $(11, -9)$. Radius of the circle is $5\sqrt{2}\ cm$. **[BOARD 2023]**
16. If $Q(0, 1)$ is equidistant from $P(5, -3)$ & $R(x, 6)$ find the values of x. **[BOARD 2023]**
17. Find the ratio in which the line segment joining the points $A(6, 3), B(-2, -5)$ is divided by x-axis. **[BOARD 2023]**
18. Find the ratio in which the point $\left(\frac{8}{5}, y\right)$ divides the line segment joining the points $(1, 2)$& $(2, 3)$. Also find the value of y. **[BOARD 2024]**
19. ABCD is a rectangle formed by the points $A(-1, -1), B(-1, 6), C(3, 6), D(3, -1)$. P, Q, R and S are mid-points of sides AB, BC, CD & DA respectively. Show that diagonals of the quadrilaterals PQRS bisect each other. **[BOARD 2024]**

20. Find the ratio in which the line segment joining the points $A(5,3)$ & $B(-1,6)$ is divided by y axis. **[BOARD 2024]**
21. $P(-2,5)$ & $Q(3,2)$ are two points. Find the coordinates of the point R on line segment PQ such that $PR = 2QR$. **[BOARD 2024]**
22. In what ratio does the x-axis divides the line segment joining the points $(2,-3)$ & $(5,6)$? Also find the coordinates of the point of intersection. **[BOARD 2024]**
23. Find the length of the median AD of ΔABC having vertices $A(0,-1), B(2,1)$ & $C(0,3)$. **[BOARD 2024]**
24. Show that $A(6,4), B(5,-2)$ *and* $C(7,-2)$ are the vertices of an isosceles triangle. **[BOARD 2024]**

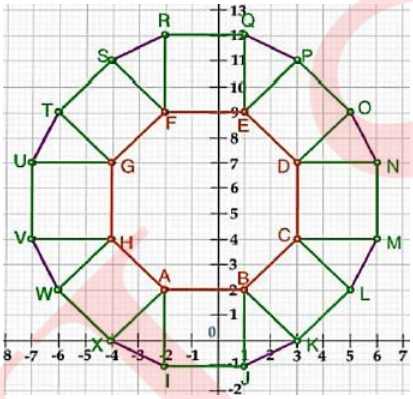
5 marks:

1. Show that the points $(a,a),(-a,-a),(-\sqrt{3}a,\sqrt{3}a)$ are the vertices of an equilateral triangle.
2. Show that the points $P(2,-1), Q(3,4), R(-2,3)$ *and* $S(-3,-2)$ are vertices of a rhombus but not a square.
3. Point A lies on the line segment XY joining $X(6,-6), Y(-4,-1)$ in such a way that $\frac{XA}{XY} = \frac{2}{5}$. If point A also lies on the line $3x + k(y+1) = 0$ find the value of k.
4. The ratio in which the line $x - 3y = 0$ divides the line segment joining the points $(-2,-5)$*and* $(6,3)$. Find the coordinates of the point of intersection.
5. Find the ratio in which the y axis divides the line segment joining the points $(-1,-4),(5,-6)$. Also find the coordinates of the point of intersection.
6. Find the ratio in which the point $(-3,k)$ divides the line segment joining the points $(-5,-4)$ *and* $(-2,3)$. Also find the value of k.
7. Find the ratio in which the point $P\left(\frac{3}{4},\frac{5}{12}\right)$ divides the line segment joining the point $A\left(\frac{1}{2},\frac{3}{2}\right)$ and $(2,-5)$.
8. If the midpoint of the line segment joining $A\left(\frac{x}{2},\frac{y+1}{2}\right)$ *and* $B(x+1,y-3)$ is $C(5,-2)$ find the value of x and y.

Case Based Questions:

1. A tiling or tessellation of a flat surface is the covering of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps. Historically, tessellations were used in ancient Rome and in Islamic art. You may find

tessellation patterns on floors, walls, paintings etc. Shown below is a tiled floor in the archaeological Museum of Seville, made using squares, triangles and hexagons. A craftsman thought of making a floor pattern after being inspired by the above design. To ensure accuracy in his work, he made the pattern on the Cartesian plane. He used regular octagons, squares and triangles for his floor tessellation pattern



Use the above figure to answer the questions that follow:

(i) What is the length of the line segment joining points B and F? **1**

(ii) The centre 'Z' of the figure will be the point of intersection of the diagonals of quadrilateral WXOP. Then what are the coordinates of Z? **1**

(iii) What are the coordinates of the point on y axis equidistant from A and G? **2**

OR

What is the area of Trapezium AFGH? **2**

2. Tharunya was thrilled to know that the football tournament is fixed with a monthly timeframe from 20th July to 20th August 2023 and for the first time in the FIFA Women's World Cup's history, two nations host in 10 venues. Her father felt that the game can be better understood if the position of players is represented as points on a coordinate plane.

(i) At an instance, the midfielders and forward formed a parallelogram. Find the position of the central midfielder (D) if the position of other players who formed the parallelogram are :- A(1,2), B(4,3) and C(6,6). **1**

(ii) Check if the Goal keeper G(-3,5), Sweeper H(3,1) and Wing-back K(0,3) fall on a same straight line. **2**

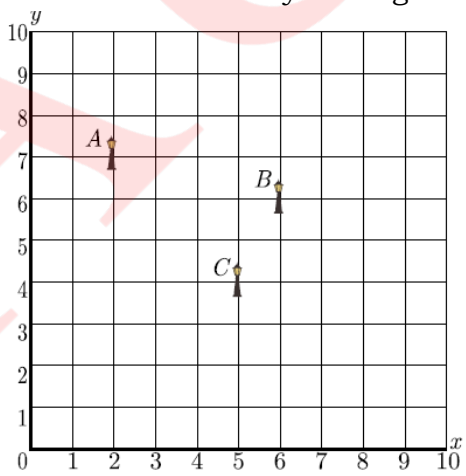
OR

Check if the Full-back J(5,-3) and centre-back I(-4,6) are equidistant from forward C(0,1) and if C is the mid-point of IJ. **2**

(iii) If Defensive midfielder A(1,4), Attacking midfielder B(2,-3) and Striker E(a,b) lie on the same straight line and B is equidistant from A and E, find the position of E. **1**

3. Resident Welfare Association (RWA) of a Gulmohar Society in Delhi have installed three electric poles *A*, *B* and *C* in a society's common park. Despite these three poles, some parts of the park are still in dark. So, RWA decides to have one more electric pole *D* in the park.

The park can be modelled as a coordinate systems given below.



(i) What is the distance of the pole *B* from the corner *O* of the park? **1**

(ii) Find the position of the fourth pole *D* so that four points *A*, *B C* and *D* form a parallelogram. **1**

(iii) What is the distance between poles *A* and *C*? **2**

OR

What is the distance between poles *B* and *D*? **2**

4. Satellite Images: Satellite images are images of Earth collected by imaging satellites operated by governments and businesses around the world. Satellite imaging companies sell images by licensing them to governments and businesses such as Apple Maps and Google Maps. It should not be confused for astronomy images collected by space telescope.

Barun lives in Jaipur in Vaishali. Satellite image of his colony is shown in given figure. In this view, his house is pointed out by a flag, which is situated at the point of intersection of x and y - axes. If he goes 2 cm east and 3 cm north from the house, then he reaches to a grocery store, If he goes 4 cm west and 6 cm south from the house, then he reaches to his office. If he goes 6 cm east and 8 cm south from the house, then he reaches to a food court. If he goes 6 cm west and 8 cm north from the house, he reaches to a his kid's school.

Based on the above information, answer the following questions.

(i) Find the distance between grocery store and food court. **1**

(ii) Find the distance of the school from the house. **1**

(iii) If the grocery store and office lie on a line, what is the ratio of distance of house from grocery store to that from office? **2**

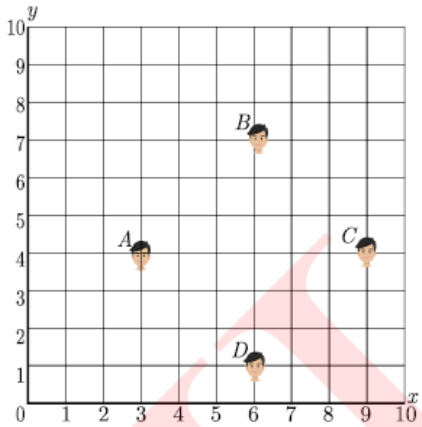
OR

What shape is formed by the coordinates of positions of school, grocery store, food court and office? **2**

5. Morning assembly is an integral part of the school's schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happenings, inspiring thoughts, speech, national anthem, etc. A good school is always particular about their morning assembly schedule. Morning assembly is important for a child's development. It is essential to understand that morning assembly is not just about standing in long queues and singing prayers or national anthem, but it's something beyond just

prayers. All the activities carried out in morning assembly by the school staff and students have a great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life.

Have you noticed that in school assembly you always stand in row and column and this make a coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as given below.



Here A, B, C and D are four friend Amar, Bharat, Colin and Dravid.

(i) What is the distance between A and B? **1**

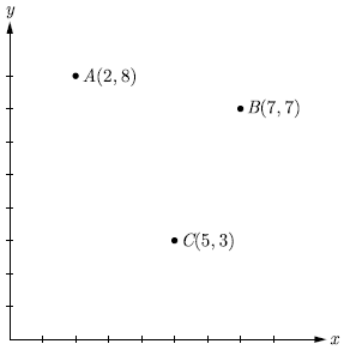
(ii) What is the distance between C and D? **1**

(iii) What is the distance between A and C? **2**

OR

What is the distance between D and B? **2**

6. Carpooling: It is the sharing of car journeys so that more than one person travels in a car, and prevents the need for others to have to drive to a location themselves. By having more people using one vehicle, carpooling reduces each person's travel costs such as: fuel costs, tolls, and the stress of driving. Carpooling is also a more environmentally friendly and sustainable way to travel as sharing journeys reduces air pollution, carbon emissions, traffic congestion on the roads, and the need for parking spaces.



Three friends Amar, Bandhu and Chakradev lives in societies represented by the points A, B and C respectively. They all work in offices located in a same building represented by the point O. Since they all go to same building every day, they

decided to do carpooling to save money on petrol. Based on the above information, answer the following questions.

(i) Which society is nearest to the office? **1**

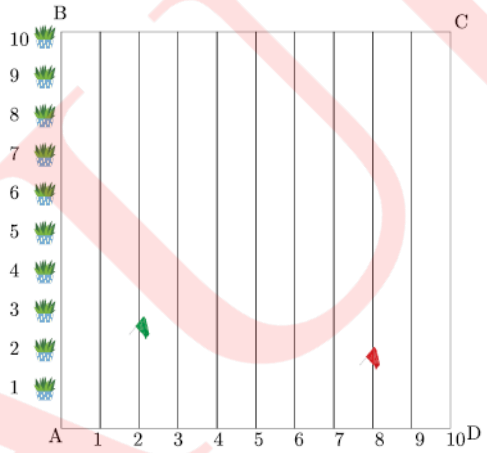
(ii) What is the distance between *A* and *C*? **1**

(iii) Find the least distance between *AB*, *OA* and *BC*? **2**

OR

If Bandhu and Chakradev planned to meet at a club situated at the mid-point of the line joining the points *B* and *C* , find the coordinates of this point. **2**

7. To conduct sports day activities, in a rectangular shaped school ground *ABCD*, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along *AB*, as shown in figure. Nishtha runs $\frac{1}{4}^{th}$ of the distance *AB* on the 2nd line and posts a green flag. Suman runs $\frac{1}{5}^{th}$ of the distance *AB* on the 8th line and posts a red flag.



(i) What is the position of green flag? **1**

(ii) What is the position of red flag? **1**

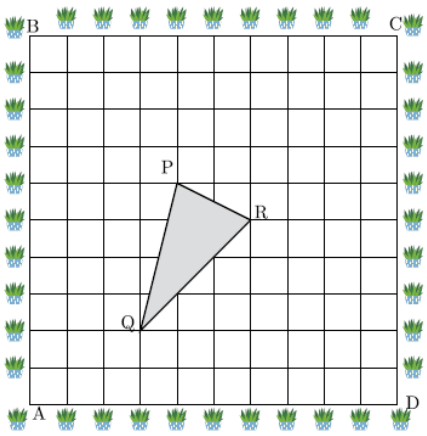
(iii) What is the distance between both the flags? **2**

OR

What is the distance of red flag from point *A*? **2**

8. A garden is in the shape of rectangle. Gardener grew sapling of Ashoka tree on the boundary of garden at the distance of 1 meter from each other. He want to decorate the garden with rose plants. He choose triangular region inside the park to grow rose plants. On the above situation, gardener took help from the students of class 10th. They made a chart for it which looks as the above figure.

[BOARD 2024]



(i) If A is taken as origin, what are the coordinates of triangle PQR? **1**

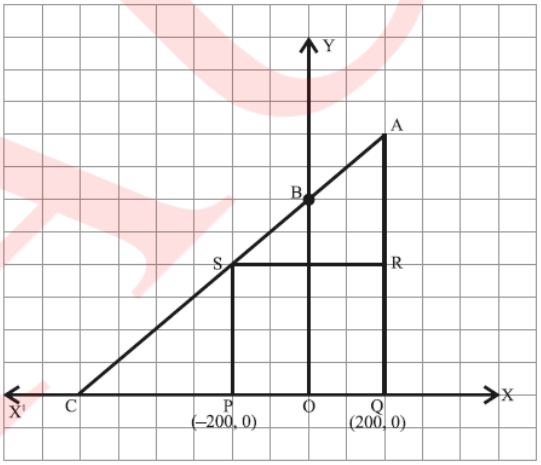
(ii) Find out if ΔPQR is an isosceles triangle. **1**

(iii) Find distances PQ & QR? **2**

OR

Find the coordinates of the point which divides the line segment joining the points P and R in the ratio 2:1 internally. **2**

9. Jagdish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O. **[BOARD 2023]**



Based on the above information, answer the following questions:

(i) Taking O as origin, coordinates of P are $(-200, 0)$ and of Q are $(200, 0)$. PQRS being a square, what are the coordinates of R and S? **1**

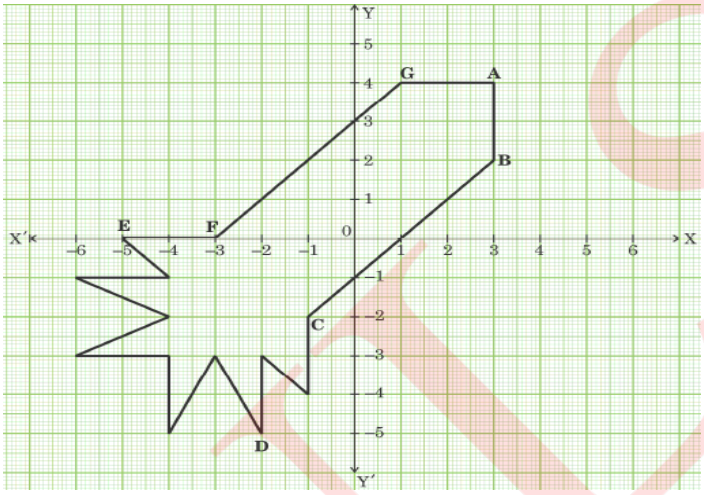
(ii) What is the area of square PQRS? **2**

OR

What is the length of diagonal PR in square PQRS? **2**

(iii) If S divides CA in the ratio K:1, what is the value of K, where point A is $(200, 800)$? **1**

10. Ryan, from a very young age, was fascinated by the twinkling of stars and the vastness of space. He always dreamt of becoming an astronaut one day. So he started to sketch his own rocket designs on the graph sheet. One such design is given below: **[BOARD 2024]**



Based on the above, answer the following questions:

(i) Find the mid-point of the segment joining F and G. **1**

(ii) What is the distance between the points A and C? **2**

OR

Find the coordinates of the point which divides the line segment joining the points A and B in the ratio 1:3 internally. **2**

(iii) What are the coordinates of the point D? **1**

GRADE X

Question Bank (MATHEMATICS)

Chapter-8 TRIGONOMETRY

1 marks:

1. If $2\tan A = 3$, then the value of $\frac{4\sin A+3\cos A}{4\sin A-3\cos A}$ is **[BOARD 2023]**

   a) $\frac{7}{\sqrt{13}}$ b) $\frac{1}{\sqrt{13}}$ c) 3 d) doesn't exist

2. If $\tan\theta = \frac{5}{12}$ then the value of $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}$ is **[BOARD 2023]**

   a) $\frac{-17}{7}$ b) $\frac{17}{7}$ c) $\frac{17}{13}$ d) $\frac{-7}{13}$

3. If $\tan\theta = \frac{x}{y}$ then $\cos\theta$ is **[BOARD 2023]**

   a) $\frac{x}{\sqrt{x^2+y^2}}$ b) $\frac{x}{\sqrt{x^2-y^2}}$ c) $\frac{y}{\sqrt{x^2+y^2}}$ d) $\frac{y}{\sqrt{x^2-y^2}}$

4. If $\sin A = \frac{2}{3}$ then value of $\cot A$ is **[BOARD 2024]**

   a) $\frac{\sqrt{5}}{2}$ b) $\frac{3}{2}$ c) $\frac{5}{4}$ d) $\frac{2}{3}$

5. If $\sin\theta = \cos\theta, (0° < \theta < 90°)$ then the value of $\sec\theta\sin\theta$ is **[BOARD 2024]**

   a) $\frac{1}{\sqrt{2}}$ b) $\sqrt{2}$ c) 1 d) 0

6. If $\sec\theta - \tan\theta = \frac{1}{3}$, then the value of $(\sec\theta + \tan\theta)$ is **[BOARD 2023]**

   a) $\frac{4}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{3}$ d) 3

7. If $\sec\theta - \tan\theta = m$, then the value of $(\sec\theta + \tan\theta)$ is **[BOARD 2024]**

   a) $1 - \frac{1}{m}$ b) $m^2 - 1$ c) $\frac{1}{m}$ d) $-m$

8. If $\cos(\alpha+\beta) = 0$ then the value of $cos\left(\frac{\alpha+\beta}{2}\right)$ is **[BOARD 2024]**

   a) $\frac{1}{\sqrt{2}}$ b) $\frac{1}{2}$ c) 0 d) $\sqrt{2}$

9. If ΔABC is a right triangle at C, then the value of $\cos(A+B)$ is

   a) 0 b) 1 c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$

10. If $\cos\theta = \frac{\sqrt{3}}{2}$ and $\sin\varphi = \frac{1}{2}$ then $\tan(\theta+\varphi)$ is **[BOARD 2024]**

    a) $\sqrt{3}$ b) $\frac{1}{\sqrt{3}}$ c) 1 d) not defined

11. If $\sin\theta + \cos\theta = \sqrt{2}$ then $\tan\theta + \cot\theta =$

    a) 1 b) 2 c) 3 d) 4

12. $\left[\frac{3}{4}\tan^2 30° - \sec^2 45° + \sin^2 60°\right]$ is equal to **[BOARD 2023]**

a) -1 b) $\frac{5}{6}$ c) $\frac{-3}{2}$ d) $\frac{1}{6}$

13. $\left[\frac{5}{8}sec^2 60° - \tan^2 60° + \cos^2 45°\right]$ is equal to **[BOARD 2023]**

a) 0 b) $\frac{-5}{3}$ c) $\frac{-1}{2}$ d) $\frac{-1}{4}$

14. $\left(\frac{2\tan 30°}{1+\tan^2 30°}\right)$ is equal to **[BOARD 2023]**

a) $\sin 60°$ b) $\cos 60°$ c) $\tan 60°$ d) $\sin 30°$

15. $\left(\frac{1-\tan^2 30°}{1+\tan^2 30°}\right)$ is equal to **[BOARD 2023]**

a) $\sin 60°$ b) $\cos 60°$ c) $\tan 60°$ d) $\cos 30°$

16. If $x \tan 60° \cos 60° = \sin 60° \cot 60°$, then x is

a) $\cos 30°$ b) $\tan 30°$ c) $\sin 30°$ d) $\cot 30°$

17. Simplified form of $\frac{\cos^2\theta}{\sin^2\theta} - \frac{1}{\sin^2\theta}$ is **[BOARD 2023]**

a) $\tan^2\theta$ b) $\sec^2\theta$ c) 1 d) -1

18. Simplified form of $(\cos^4 A - \sin^4 A)$ is **[BOARD 2023]**

a) $2\sin^2 A - 1$ b) $2\sin^2 A + 1$ c) $2\cos^2 A + 1$ d) $2\cos^2 A - 1$

19. $\sec\theta$ when expressed in terms of $\cot\theta$ is equal to **[BOARD 2023]**

a) $\frac{1+\cot^2\theta}{\cot\theta}$ b) $\frac{\sqrt{1+\cot^2\theta}}{\cot\theta}$ c) $\sqrt{1+\cot^2\theta}$ d) $\frac{\sqrt{1-\cot^2\theta}}{\cot\theta}$

20. Which of the following is true for all values of θ $(0° \le \theta \le 90°)$? **[BOARD 2023]**

a) $\cos^2\theta - \sin^2\theta = 1$ c) $cosec^2\theta - \sec^2\theta = 1$

b) $\sec^2\theta - \tan^2\theta = 1$ d) $\cot^2\theta - \tan^2\theta = 1$

21. If θ is an acute angle of a right angled triangle, then which of the following equation is not true? **[BOARD 2023]**

a) $\sin\theta \cot\theta = \cos\theta$ c) $\cos\theta \tan\theta = \sin\theta$

b) $cosec^2\theta - \cot^2\theta = 1$ d) $\tan^2\theta - \sec^2\theta = 1$

22. If $x = p\sec\theta$ and $y = q\tan\theta$ then

a) $x^2 - y^2 = p^2q^2$ c) $x^2q^2 - y^2p^2 = pq$

b) $x^2q^2 - y^2p^2 = \frac{1}{p^2q^2}$ d) $x^2q^2 - y^2p^2 = p^2q^2$

23. $(\sec^2\theta - 1)(cosec^2\theta - 1)$ is equal to **[BOARD 2023]**

a) -1 b) 1 c) 0 d) 2

24. $2\cos^2\theta\,(1+\tan^2\theta)$ is equal to **[COMPARTMENT 2023]**

a) 0 b) 1 c) 2 d) 3

25. If $\frac{x}{3}=2\sin A$, $\frac{y}{3}=2\cos A$ then the value of x^2+y^2 is **[BOARD 2024]**

a) 36 b) 9 c) 6 d) 18

26. If $x\sin^3\theta+y\cos^3\theta=\sin\theta\cos\theta$ and $x\sin\theta=y\cos\theta$ then x^2+y^2 is

a) 0 b) $\frac{1}{2}$ c) 1 d) $\frac{3}{2}$

27. If $x=a\cos\theta$ and $y=b\,sin\theta$ then the value of $b^2x^2+a^2y^2$ is **[BOARD 2024]**

a) a^2b^2 b) ab c) a^4b^4 d) a^2+b^2

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

28. ***Assertion (A):*** For $0<\theta\leq 90°$, $cosec\,\theta-\cot\theta$ and $cosec\,\theta+\cot\theta$ are reciprocal of each other.

Reason (R): $cosec^2\theta-\cot^2\theta=1$. **[BOARD 2023]**

29. ***Assertion (A):*** If $\sin A=\frac{1}{3}(0°<A<90°)$ then the value of $\cos A$ is $\frac{2\sqrt{2}}{3}$.

Reason (R): For every angle θ, $\sin^2\theta+\cos^2\theta=1$. **[BOARD 2024]**

2 marks:

1. Find an acute angle θ when $\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}=\frac{1-\sqrt{3}}{1+\sqrt{3}}$.
2. Find the value of $\cos 2\theta$ if $2\sin 2\theta=\sqrt{3}$.
3. If $\sqrt{3}\sin\theta-\cos\theta=0$ and $0°<\theta<90°$, find the value of θ.
4. If $\sin\theta+\cos\theta=\sqrt{3}$, then find the value of $\sin\theta\cos\theta$. **[BOARD 2023]**
5. If θ is an acute angle and $\sin\theta=\cos\theta$, find the value of $\tan^2\theta+\cot^2\theta-2$. **[BOARD 2023]**
6. If $\sin\theta-\cos\theta=0$ then find the value of $\sin^4\theta+\cos^4\theta$. **[BOARD 2023]**
7. If $\sin\alpha=\frac{1}{2}$ and $\cot\beta=\sqrt{3}$, then find the value of $cosec\,\alpha+cosec\,\beta$. **[BOARD 2023]**
8. If $\sin\theta+\sin^2\theta=1$, then prove that $\cos^2\theta+\cos^4\theta=1$. **[BOARD 2023]**

9. If $\cos A + \cos^2 A = 1$, then find the value of $\sin^2 A + \sin^4 A$. **[BOARD 2023]**

10. If $\tan\theta = \frac{1}{\sqrt{7}}$ then show that $\frac{cosec^2\theta - \sec^2\theta}{cosec^2\theta + \sec^2\theta} = \frac{3}{4}$. **[BOARD 2023]**

11. If $4\cot^2 45° - \sec^2 60° + \sin^2 60° + p = \frac{3}{4}$, then find the value of p. **[BOARD 2023]**

12. Find the value of x: $2\ cosec^2 30° + x\sin^2 60° - \frac{3}{4}\tan^2 30° = 10$.

13. Evaluate: $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$. **[BOARD 2023 & BOARD 2024]**

14. Evaluate: $\frac{5}{\cot^2 30°} + \frac{1}{\sin^2 60°} - \cot^2 45° + 2\sin^2 90°$. **[BOARD 2023]**

15. Evaluate: $2\sec^2\theta + 3\ cosec^2\theta - 2\sin\theta\cos\theta$ if $\theta = 45°$. **[BOARD 2023]**

16. Evaluate: $2\sqrt{2}\cos 45°\sin 30° + 2\sqrt{3}\cos 30°$. **[BOARD 2024]**

17. If A and B are acute angles such that $\sin(A - B) = 0$ and $2\cos(A + B) - 1 = 0$, then find the angles A and B. **[BOARD 2023]**

18. If $2\sin(A + B) = \sqrt{3}$ and $\cos(A - B) = 1$ then find A and B. **[BOARD 2024]**

19. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then prove that $a^2 + b^2 = m^2 + n^2$. **[BOARD 2023]**

20. Prove that $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2\ cosec\ A$. **[BOARD 2023]**

21. If $A = 60°$ and $B = 30°$, verify that $\sin(A + B) = \sin A\cos B + \cos A\sin B$. **[BOARD 2024]**

3 marks:

1. Prove that $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$. **[BOARD 2023]**
2. Prove that $\frac{1 + \sec\theta - \tan\theta}{1 + \sec\theta + \tan\theta} = \frac{1 - \sin\theta}{\cos\theta}$. **[BOARD 2024]**
3. Prove that $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$. **[BOARD 2024]**
4. Prove that $\frac{\cot\theta + cosec\ \theta - 1}{\cot\theta - cosec\ \theta + 1} = \frac{1 + \cos\theta}{\sin\theta}$.
5. Prove that $(1 + \cot A - cosec\ A)(1 + \tan A + \sec A) = 2$.
6. Prove that $(cosec\ A - \sin A)(\sec A - \cos A) = \frac{1}{\cot A + \tan A}$. **[BOARD 2023 & BOARD 2024]**
7. Prove that $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0$. **[BOARD 2023]**
8. Prove that $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$. **[BOARD 2024]**
9. Prove that $\left(\frac{1}{\cos\theta} - \cos\theta\right)\left(\frac{1}{\sin\theta} - \sin\theta\right) = \frac{1}{\tan\theta + \cot\theta}$. **[BOARD 2023]**

10. Prove that $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\,cosec\,\theta$. **[BOARD 2023 & BOARD 2024]**

11. Prove that $\frac{\cos^2\theta}{1-\tan\theta}+\frac{\sin^3\theta}{\sin\theta-\cos\theta}=1+\sin\theta\cos\theta$. **[BOARD 2023]**

12. Prove that $\frac{\tan^3\theta}{1+\tan^2\theta}+\frac{\cot^3\theta}{1+\cot^2\theta}=\sec\theta\,cosec\,\theta-2\sin\theta\cos\theta$.

13. Prove that $\frac{\tan\theta-\cot\theta}{\sin\theta\cos\theta}=\sec^2\theta-cosec^2\theta$. **[BOARD 2024]**

14. Prove that $\frac{\sin A-2\sin^3 A}{2\cos^3 A-\cos A}=\tan A$. **[BOARD 2023 & BOARD 2024]**

15. Prove that $\frac{\sin A+\cos A}{\sin A-\cos A}+\frac{\sin A-\cos A}{\sin A+\cos A}=\frac{2}{2\sin^2 A-1}$. **[BOARD 2024]**

16. Prove that $\sec A\,(1-\sin A)(\sec A+\tan A)=1$. **[BOARD 2023]**

17. Prove that $(\sin\theta+\cos\theta)(\tan\theta+\cot\theta)=\sec\theta+cosec\,\theta$. **[BOARD 2023]**

18. Prove that $(\sin\theta+cosec\,\theta)^2+(\cos\theta+\sec\theta)^2=7+\tan^2\theta+\cot^2\theta$.

19. Prove that $\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}=1+\sec\theta\,cosec\,\theta$. **[BOARD 2023 & BOARD 2024]**

20. Prove that $\frac{\tan A}{1+\sec A}-\frac{\tan A}{1-\sec A}=2\,cosec\,A$. **[BOARD 2023]**

21. Prove that $\frac{\tan^2 A}{\tan^2 A-1}+\frac{cosec^2 A}{\sec^2 A-cosec^2 A}=\frac{1}{1-2\cos^2 A}$.

22. Prove that $\frac{1+\sec A}{\sec A}=\frac{\sin^2 A}{1-\cos A}$. **[BOARD 2023]**

23. Prove that $\frac{cosec^2\theta-\sec^2\theta}{cosec^2\theta+\sec^2\theta}=\frac{3}{4}$ if $\tan\theta=\frac{1}{\sqrt{7}}$. **[BOARD 2024]**

24. Prove that $\sqrt{\frac{1-\cos A}{1+\cos A}}=cosec\,A-\cot A$.

25. If $\sin\theta+\cos\theta=p$ and $\sec\theta+cosec\,\theta=q$, then prove that $q(p^2-1)=2p$.
[BOARD 2023]

26. If $1+\sin^2\theta=3\sin\theta\cos\theta$, then prove that $\tan\theta=1\ or\ \frac{1}{2}$.

27. If $\sin\theta+\cos\theta=\sqrt{2}$ then prove that $\tan\theta+\cot\theta=2$.

5 marks:

1. (a) Prove that $\sqrt{\sec^2\theta+cosec^2\theta}=\tan\theta+\cot\theta$.

   (b) Evaluate: $\frac{\cos 45^\circ}{\sec 30^\circ+cosec\ 30^\circ}$. **[COMPARTMENT 2023 & BOARD 2024]**

2. If $x\sin^3\theta+y\cos^3\theta=\sin\theta\cos\theta$ and $x\sin\theta=y\cos\theta$ then prove that $x^2+y^2=1$.
[COMPARTMENT 2023]

3. Prove that $\frac{1+\sin\theta}{1-\sin\theta}-\frac{1-\sin\theta}{1+\sin\theta}=4\tan\theta\sec\theta$. **[COMPARTMENT 2023]**

4. Prove that $\frac{\sin\theta}{\cot\theta+cosec\,\theta} = 2 + \frac{\sin\theta}{\cot\theta-cosec\,\theta}$.

5. Evaluate: $\frac{\tan^2 60°+4\sin^2 45°+3\sec^2 60°+5\cos^2 90°}{cosec\ 30°+\sec 60°-\cot^2 30°}$. **[COMPARTMENT 2023]**

6. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then show that $(m^2 - n^2) = 4\sqrt{mn}$.
[COMPARTMENT 2023]

7. If in an acute angle ΔABC, $\sec(B + C - A) = 2$ and $\tan(C + A - B) = \frac{1}{\sqrt{3}}$ then find the three angles of ΔABC. **[COMPARTMENT 2023]**

8. If $\sec\theta = x + \frac{1}{4x}$, $x \neq 0$ then find $(\sec\theta + \tan\theta)$.

9. If $15\tan^2\theta + 4\sec^2\theta = 23$, then find the value of $(\sec\theta + cosec\,\theta)^2 - \sin^2\theta$.

10. If $\sqrt{3}\cot^2\theta - 4\cot\theta + \sqrt{3} = 0$ then find the value of $\cot^2\theta + \tan^2\theta$.

GRADE X

Question Bank (MATHEMATICS)

Chapter-9 APPLICATIONS OF TRIGONOMETRY

1 marks:

1. From a point on the ground, which is 30 m away from the foot of the vertical tower, the angle of elevation of the top of the tower is found to be 60°. The height (in metres) of the tower is: **[BOARD 2024]**

   a) $10\sqrt{3}$ b) $30\sqrt{3}$ c) 60 d) 30

2. At some time of the day, the length of the shadow of a tower is equal to its height. Then, the Sun's altitude at the time is **[BOARD 2024]**

   a) 30° b) 45° c) 60° d) 90°

3. If a vertical pole of length 7.5 m casts a shadow 5m long on the ground and at the same time, a tower casts a shadow 24m long, then the height of the tower is: **[BOARD 2024]**

   a) 20m b) 40m c) 60m d) 80m

4. The ratio of the length of the pole and its shadow on the ground is $1:\sqrt{3}$. The angle of elevation of the Sun is: **[BOARD 2024]**

   a) 90° b) 60° c) 45° d) 30°

5. The length of the shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. The angle of elevation of the Sun is: **[BOARD 2024]**

   a) 30° b) 45° c) 60° d) 90°

6. If a pole 6m high casts a shadow $2\sqrt{3}m$ long on the ground, then Sun's elevation is **[BOARD 2023]**

   a) 30° b) 45° c) 60° d) 90°

7. If the angle of depression of an object from a 75m high tower is 30° then the distance of the object from the tower is

   a) $25\sqrt{3}m$ b) $50\sqrt{3}m$ c) $75\sqrt{3}m$ d) $150\,m$

8. A tree casts a shadow 15m long on the level of ground, when the angle of elevation of the Sun is 45°. The height of a tree is

   a) 10 m b) 14 m c) 8 m d) 15 m

9. A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground, then the height of the pole, if the angle made by the rope with the ground level is 30°, is

   a) 5 m b) 10 m c) 15 m d) 20 m

10. An observer, 1.5 m tall is 20.5 m away from a tower 22 m high, then the angle of elevation of the top of the tower from the eye of the observer is

    a) 10 m b) 14 m c) 8 m d) 15 m

11. From the top of 7 m high building the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°, then the height of the tower is

    a) 14.124 m b) 17.124 m c) 19.124 m d) 15.124 m

12. A tree is broken by the wind. The top stuck the ground at an angle of 30° and at a distance of 10 m from its foot. The whole height of the tree is

    a) $10\sqrt{3}\,m$ b) $3\sqrt{10}\,m$ c) $20\sqrt{3}\,m$ d) $3\sqrt{20}\,m$

2 marks:

1. The length of the shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. Find the angle of elevation of the Sun. **[BOARD 2023]**
2. The angle of elevation of the top of a tower from a point on the ground is 30m away from the foot of the tower, is 30°. Find the height of the tower. **[BOARD 2023]**
3. Find the length of the shadow on the ground of a pole of height 18m when angle of elevation θ of the Sun is such that $\tan\theta = \frac{6}{7}$. **[BOARD 2023]**

3 marks:

1. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of a tower from the foot of the building is 60°. If the tower is 50 m high, then find the height of the building.
2. The top of two poles of height 16 m and 10 m are connected by a length ‘ l’ meter. If the wire makes an angle of 30° with the horizontal, then find ‘ l’.
3. An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. $(Use\ \sqrt{2} = 1.414)$
4. A boy, flying a kite with a string of 85 m long, which is making an angle θ with the ground. Find the height of the kite. $\left(\text{Given}\tan\theta = \frac{15}{8}\right)$

5 marks:

1. A pole of 6m high is fixed on the top of the tower. The angle of elevation of the top of the pole observed from a point P on the ground is 60° and the angle of depression of the point P from the top of the tower is 45°. Find the height of the tower and the distance of the point P from the foot of the tower. $(Use\ \sqrt{3} = 1.73)$

[BOARD 2024]

2. From the top of a building 60m high, the angles of depression of the top and bottom of the vertical lamp post are observed to be 30° and 60° respectively.
   (i) Find the horizontal distance between the building and the lamp post.
   (ii) Find the distance between the tops of the building and the lamp post.

[BOARD 2024]

3. From the top of a 15m high building, the angle of elevation of the top of a tower is found to be 30°. From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower and the distance between tower and the building. **[BOARD 2024]**
4. As observed from the top of a 75m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 60°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between two ships. $(Use\ \sqrt{3} = 1.73)$ **[BOARD 2023]**
5. From the top of 45m high light house, the angles of depression of two ships, on the opposite side of it, are observed to be 30° and 60°. If the line joining the ships passes through the foot of the light house, find the distance between the ships. $(Use\ \sqrt{3} = 1.73)$ **[BOARD 2024]**
6. The angle of elevation of an aircraft from a point A on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. The aircraft is flying at a constant height of $3500\sqrt{3}m$ at a uniform speed. Find the speed of the aircraft.

[BOARD 2024]

7. A person standing on the bank of a river observes that the angle of elevation of the top of a tower on the opposite bank is 60°. When he moves 30m away from the bank, he finds the angle of elevation to be 30°. Find the height of the tower and width of the river. $(Use\ \sqrt{3} = 1.732)$ **[BOARD 2024]**

8. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20m high building are 45° and 60° respectively. Find the height of the tower. **[BOARD 2024]**
9. Two pillars of equal lengths stand on either side of a road which is 100m wide, exactly opposite to each other. At a point on the road between the pillars, the angles of elevation of the tops of the pillars are 60° and 30°. Find the length of each pillar and distance of the point on the road from the pillars. $(Use\ \sqrt{3} = 1.732)$ **[BOARD 2024]**
10. The angles of depression of the top and the bottom of a 50 m high building from the top of a tower are 45° and 60°, respectively. Find the height of the tower. $(Use\ \sqrt{3} = 1.73)$ **[BOARD 2024]**
11. From a top of 7m high building, the angle of elevation of the top a cable tower is 60° and the angle of depression of its foot is 30°. Find the height of the tower. **[BOARD 2023]**
12. The angles of depression of the top and the bottom of a 8m tall building from the top of a multi-storied building are 30° and 45° respectively. Find the height of the multi-storied building and the distance between the two buildings. **[BOARD 2024]**
13. From a point on a bridge across the river, the angles of depressions of the banks on opposite sides of the river are 30° and 60° respectively. If the bridge is at a height of 4m from the banks, find the width of the river. **[BOARD 2024]**
14. From a window 15 m high above the ground in a street, the angles of elevation and depression of top and the foot of another house on the opposite side of the street are 30° and 45° respectively. Find the height of the opposite house. $(Use\ \sqrt{3} = 1.732)$ **[BOARD 2024]**
15. The angle of elevation of the top of a tower 24m high from the foot of another tower in the same plane is 60°. The angle of elevation of the top of second tower from the foot of the first tower is 30°. Find the distance between two towers and the height of the other tower. Also, find the length of wire attached to the tops of both the towers. **[BOARD 2023]**
16. A spherical balloon of radius 'r' subtends an angle of 60° at the eye of an observer. If the angle of elevation of its centre is 45° from the same point, then prove that height of the centre of the balloon is $\sqrt{2}$ times its radius. **[BOARD 2023]**

17. A ladder set against a wall at angle 45° to the ground. If the foot of the ladder is pulled away from the wall through a distance of 4m, its top slides a distance of 3m down the wall making an angle 30° with the ground. Find the final height of the top of the ladder from the ground and length of the ladder. **[BOARD 2023]**

18. An aeroplane when flying at a height of 3000m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. Also, find the distance of the first plane from the point of observation. $(Use\ \sqrt{3} = 1.73)$ **[BOARD 2023]**

19. A straight highway leads to the foot of the tower. A man standing on the top of the 75m high tower observes two cars at angles of depression of 30° and 60°, which are approaching the foot of the tower. If one car is exactly behind the other on the same side of the tower, find the distance between the two cars. $(Use\ \sqrt{3} = 1.73)$ **[BOARD 2023]**

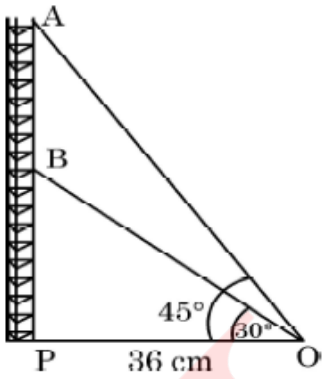
20. One observer estimates the angle of elevation to the basket of a hot air balloon to be 60°, while another observer 100m away estimates the angle of elevation to be 30°. Find:
    (i) The height of the basket from the ground.
    (ii) The distance of the basket from the first observer's eye.
    (iii) The horizontal distance of the second observer from the basket.
    [BOARD 2023]

21. Amit standing on a horizontal plane, find a bird flying at a distance of 200m from him at an elevation of 30°. Deepak standing on the roof of a 50 m high building, find the angle elevation of the same bird to be 45°. Amit and Deepak are on opposite sides of the bird. Find the distance of the bird from Deepak.

Case Based Questions:

1. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two sections A and B. Tower is supported by wires from a point O.

Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the section B is 30° and the angle of the elevation of the top of section A is 45°. **[BOARD 2023]**



Based on the above information, answer the following questions:

(i) Find the length of the wire from the point O to the top of section B. **1**

(ii) Find the distance AB. **2**

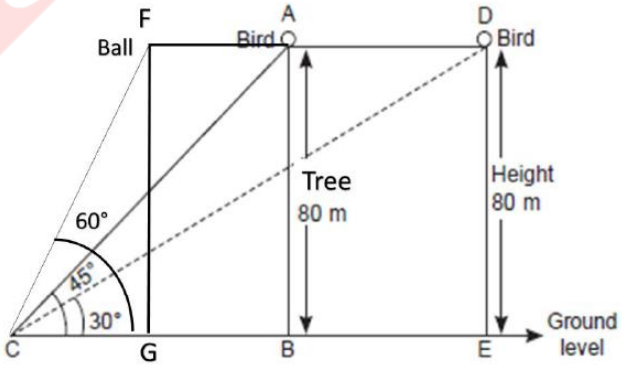
OR

Find the area of ΔOPB. **2**

(iii) Find the height of the section A from the base of the tower. **1**

2. One evening, Karthi was in a park. Children were playing cricket. Birds were singing on a nearby tree of height 80m. He observed a bird on the tree at an angle of elevation of 45°.

When a sixer was hit, a ball flew through the tree frightening the bird to fly away. In 2 seconds, he observed the bird flying at the same height at an angle of elevation of 30° and the ball flying towards him at the same height at an angle of elevation of 60°.



Based on the above information, answer the following questions:

(i) At what distance from the foot of the tree was he observing the bird sitting on the tree? **1**

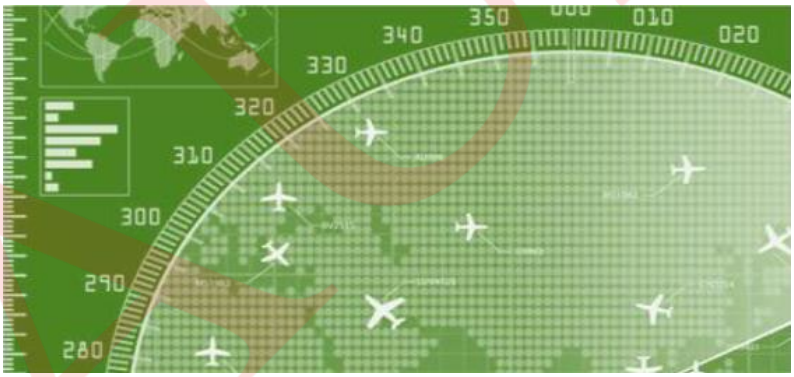
(ii) How far did the bird fly in the mentioned time? **2**

OR

After hitting the tree, how far did the ball travel in the sky when Karthi saw the ball? **2**

(iii) What is the speed of the bird in m/min if it had flown $20(\sqrt{3}+1)$m? **1**

3. We all have seen the airplanes flying in the sky but might have not thought of how they actually reach the correct destination. Air Traffic Control (ATC) is a service provided by ground-based air traffic controllers who direct aircraft on the ground and through a given section of controlled airspace, and can provide advisory services to aircraft in non-controlled airspace. Actually, all this air traffic is managed and regulated by using various concepts based on coordinate geometry and trigonometry.



At a given instance, ATC finds that the angle of elevation of an airplane from a point on the ground is 60°. After a flight of 30 seconds, it is observed that the angle of elevation changes to 30°. The height of the plane remains constantly as $3000\sqrt{3}m$. Use the above information to answer the questions that follows:

(i) Draw neat labeled figure to show the above situation diagrammatically. **1**

(ii) What is the distance travelled by the plane in 30 seconds? **2**

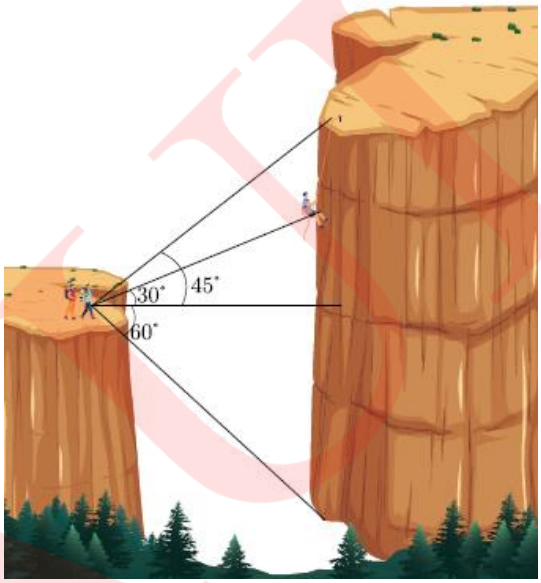
OR

Keeping the height constant, during the above flight, it was observed that after $15(\sqrt{3}-1)$ seconds, the angle of elevation changed to 45°. How much is the distance travelled in that duration. **2**

(iii) What is the speed of the plane in km/hr. **1**

4. **Height of a Climber:** Himalayan trekking Club has just hiked to the south rim of a large canyon, when they spot a climber attempting to scale the taller northern face. Knowing the distance between the sheer walls of the northern and southern faces of the canyon is approximately 150 m, they attempt to compute the distance remaining for the climbers to reach the top of the northern rim.

Using a homemade transit, they sight an angle of depression of 60° to the bottom of the north face and angles of elevation of 30° and 45° to the climbers and top of the northern rim respectively.



Based on the above information answer the following questions:

(i) How high is the southern rim of the canyon? **1**

(ii) How high is the northern rim? **2**

(iii) How much farther until the climber reaches the top? **1**

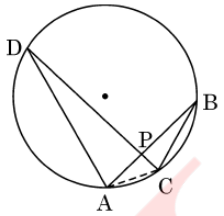
GRADE X

Question Bank (MATHEMATICS)

Chapter-10 CIRCLES

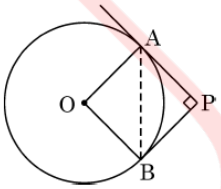
1 marks:

1. AB and CD are two chords of a circle intersecting at P. Choose the correct statement from the following: **[BOARD 2024]**



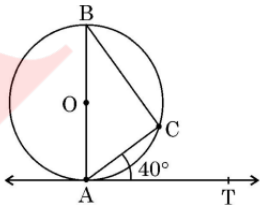
a) $\Delta ADP \sim \Delta CBA$ b) $\Delta ADP \sim \Delta BPC$ c) $\Delta ADP \sim \Delta BCP$ d) $\Delta ADP \sim \Delta CBP$

2. In the given figure, tangents PA and PB to the circle centered at O, from point P are perpendicular to each other. If $PA = 5\ cm$ then length of AB is **[BOARD 2024]**



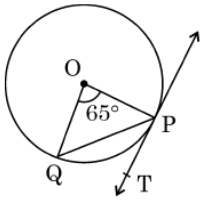
a) 5 cm b) $5\sqrt{2}\ cm$ c) $2\sqrt{5}\ cm$ d) 10 cm

3. In the given figure, AT is tangent to a circle centered at O. If $\angle CAT = 40°$ then $\angle CBA$ is equal to **[BOARD 2024]**



a) 70° b) 50° c) 65° d)40°

4. In the given figure, PT is tangent to a circle with centre O. Chord PQ subtends an angle of 65° at the centre. The measure of $\angle QPT$ is **[BOARD 2023 & BOARD 2024]**

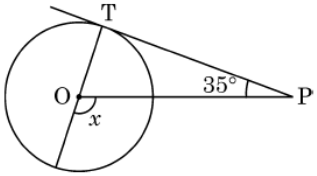


a) 65° b) 57.5° c) 67.5° d) 32.5°

5. The maximum number of common tangents that can be drawn to two circles intersecting at two distinct points is **[BOARD 2024]**

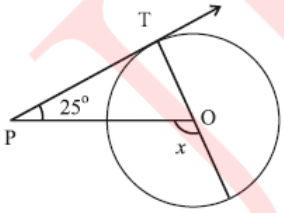
   a) 4 b) 3 c) 2 d) 1

6. In the given figure, if PT is a tangent to a circle with centre O and $\angle TPO = 35°$ then the measure of $\angle x$ is **[BOARD 2024]**



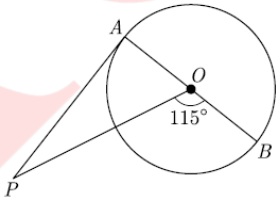
   a) 110° b) 115° c) 120° d) 125°

7. In the given figure, PT is a tangent at T to the circle with centre O. If $\angle TPO = 25°$ then x is **[BOARD 2023]**

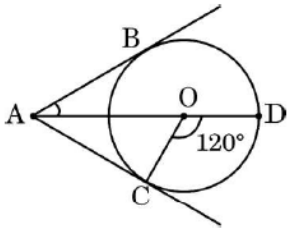


   a) 25° b) 65° c) 90° d) 115°

8. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 115°$ then $\angle APO$ is

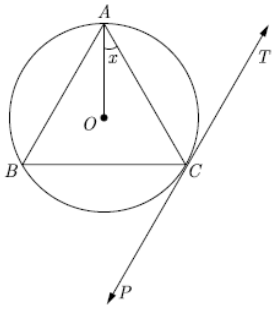


9. In the given figure, AC and AB are tangents to a circle centered at O. If $\angle COD = 120°$ then $\angle BAO$ is **[BOARD 2023]**



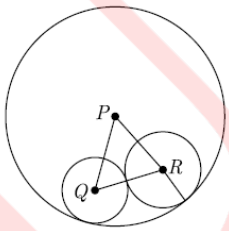
   a) 30° b) 60° c) 45° d) 90°

10. In the given figure, PT is a tangent at a point C to the circle with centre O. If $\angle ACP = 118°$ then $\angle x$ is



a) 28° b) 32° c) 42° d) 38°

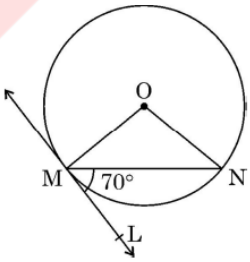
11. In the given figure, three circles with centres P, Q and R are drawn, such that the circles with centres Q and R touch each other externally and they touch the circle with centre P internally. If $PQ = 10\ cm, PR = 8\ cm$ and $QR = 12\ cm$ then the diameter of the largest circle is



a) 30 cm b) 20 cm c) 10 cm d) 40 cm

12. In the given figure, O is the centre of the circle. MN is the chord and the tangent ML at point M makes an angle of 70° with MN. The measure of $\angle MON$ is

[BOARD 2024]

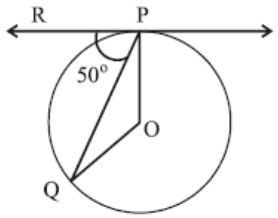


a) 120° b) 140° c) 70° d) 90°

13. If an arc subtends an angle of 90° at the centre of a circle, then the ratio of its length to the circumference of the circle is **[BOARD 2024]**

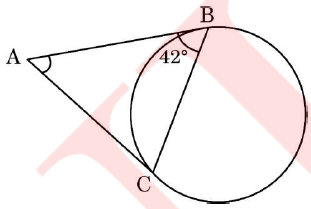
a) 2:3 b) 1:4 c) 4:1 d) 1:3

14. In the given figure, O is the centre of the circle and PQ is the chord. If the tangent PR at P makes an angle of 50° with PQ, then the $\angle POQ$ is **[BOARD 2023]**



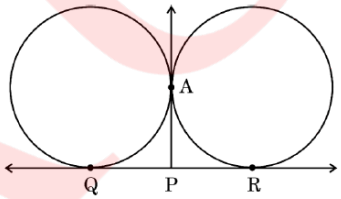
a) 50° b) 40° c) 100° d) 130°

15. In the given figure, AB and AC are tangents to the circle. If $\angle ABC = 42°$ then the measure of $\angle BAC$ is **[BOARD 2024]**



a) 96° b) 42° c) 106° d) 86°

16. In the given figure, QR is the common tangent to the two given circles touching externally at A. The tangent at A meets QR at P. If $AP = 4.2\ cm$ then the length of QR is **[BOARD 2024]**

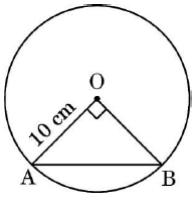


a) $4.2\ cm$ b) $2.1\ cm$ c) $8.4\ cm$ d) $6.3\ cm$

17. The area of the square inscribed in a circle of radius $5\sqrt{2}\ cm$ is **[BOARD 2024]**

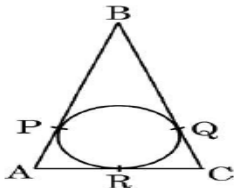
a) $50\ cm^2$ b) $100\ cm^2$ c) $25\ cm^2$ d) $200\ cm^2$

18. A chord of a circle of radius 10 cm subtends a right angle at its centre. The length of the chord (in cm) is **[BOARD 2024]**



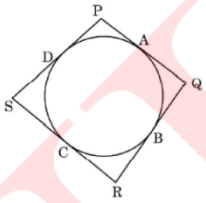
a) $5\sqrt{2}$ b) $10\sqrt{2}$ c) $\frac{5}{\sqrt{2}}$ d) 5

19. In the given figure, $AB = BC = 10\ cm$. If $AC = 7\ cm$, then the length of BP is **[BOARD 2023]**



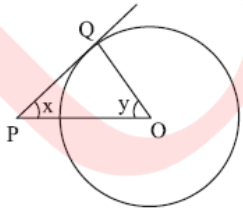
a) 3.5 cm b) 7 cm c) 6.5 cm d) 5 cm

20. In the given figure, the quadrilateral PQRS circumscribes a circle. Here PA+CS is equal to **[BOARD 2023]**



a) QR b) PR c) PS d) PQ

21. In the given figure, PQ is a tangent to the circle with centre O.If $\angle OPQ = x, \angle POQ = y$ then $x + y$ is **[BOARD 2023]**

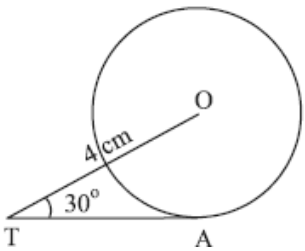


a) 45° b) 90° c) 60° d) 180°

22. The length of tangent drawn to a circle of radius 9 cm from a point 41 cm from the centre is: **[BOARD 2023]**

a) 40 cm b) 9 cm c) 41 cm d) 50 cm

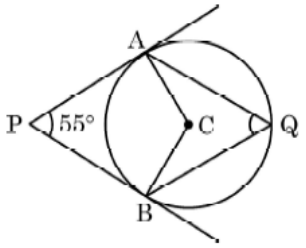
23. In the given figure, TA is a tangent to the circle with centre O such that $OT = 4\ cm, \angle OTA = 30°$ then length of TA is **[BOARD 2023]**



a) $2\sqrt{3}\ cm$ b) $2\ cm$ c) $2\sqrt{2}\ cm$ d) $\sqrt{3}\ cm$

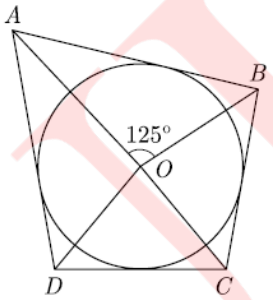
24. In the given figure, PA and PB are tangents from an external point P to circle with centre C and Q is any point on the circle. Then the measure of $\angle AQB$ is

[BOARD 2023]



a) 62.5° b) 125° c) 55° d) 90°

25. In the given figure, if $\angle AOB = 125°$ then $\angle COD$ is equal to



a) 62.5° b) 45° c) 35° d) 55°

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

26. ***Assertion (A):*** The tangents drawn at the end points of a diameter of a circle, are parallel.

Reason (R): Diameter of a circle is the longest chord. **[BOARD 2024]**

27. ***Assertion (A):*** A tangent to a circle is perpendicular to the radius through the point of contact.

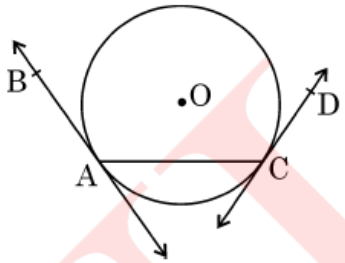
Reason (R): The length of the tangents drawn from an external point to a circle are equal. **[BOARD 2023]**

28. ***Assertion (A):*** If PA and PB are tangents drawn from an external point P to a circle with centre O, then the quadrilateral AOBP is cyclic.

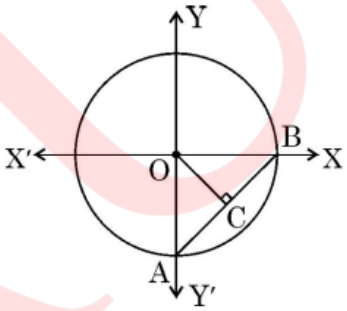
Reason (R): The angle between two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre. **[BOARD 2023]**

2 marks:

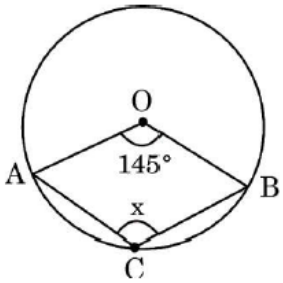
1. In the given figure, AB and CD are tangents to a circle centered at O. Is $\angle BAC = \angle DCA$? Justify your answer. **[BOARD 2024]**



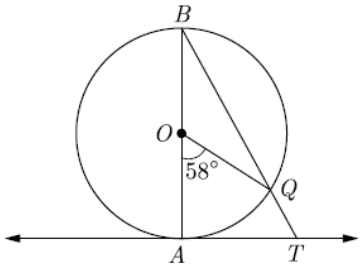
2. In the given figure, a circle centered at O has radius 7 cm, OC is median of ΔOAB. Find the length of median OC. **[BOARD 2024]**



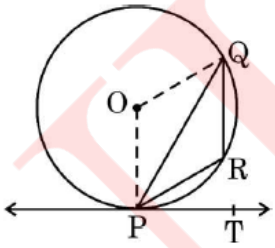
3. From an external point P, two tangents PA and PB are drawn to the circle with centre O. Prove that OP is the perpendicular bisector of chord AB. **[BOARD 2024]**
4. In the given figure, O is the centre of the circle. If $\angle AOB = 145°$ then find the value of x. **[BOARD 2024]**



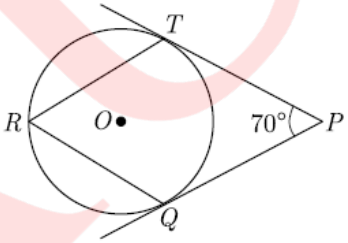
5. In the given figure, AB is the diameter of a circle with centre O and AT is a tangent. If $\angle AOQ = 58°$ then find $\angle ATQ$.



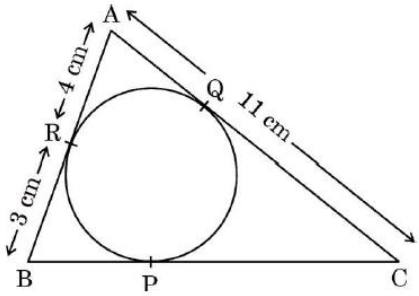
6. In the given figure, PQ is a chord of the circle centered at O. PT is a tangent to a circle at P. If $\angle QPT = 55°$ then find $\angle PRQ$. **[BOARD 2023]**



7. In the given figure, O is the centre of the circle. PT and PQ are tangents to the circle from an external point P. If $\angle TPQ = 70°$ find $\angle TRQ$.



8. In the given figure, ΔABC is circumscribing a circle. Find the length of BC, if $AR = 4\ cm, BR = 3\ cm$ and $AC = 11\ cm$. **[BOARD 2024]**



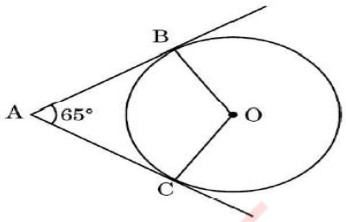
9. If two tangents inclined at an angle of 60° are drawn to a circle of radius 3 cm, then find the length of each tangent. **[BOARD 2024]**

10. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

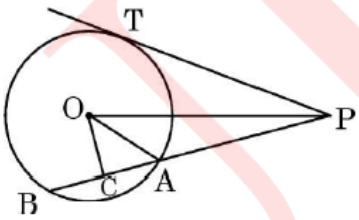
[BOARD 2023 & BOARD 2024]

11. In the given figure, O is the centre of the circle. AB and AC are tangents drawn to the circle from point A. If $\angle BAC = 65°$, then find the measure of $\angle BOC$.

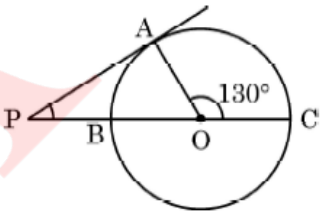
[BOARD 2023]



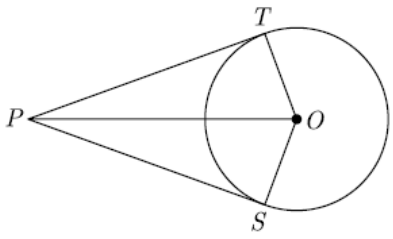
12. In the given figure, PT is a tangent to the circle centered at O. OC is the perpendicular to chord AB. Prove that $PA.PB = PC^2 - AC^2$. **[BOARD 2023]**



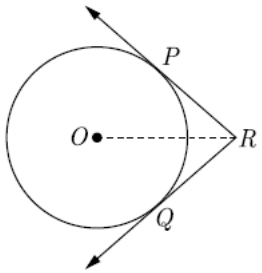
13. In the given figure, PA is a tangent to the circle drawn from the external point P and PBC is the secant to the circle with BC as diameter. If $\angle AOC = 130°$ then find $\angle APB$. **[BOARD 2023]**



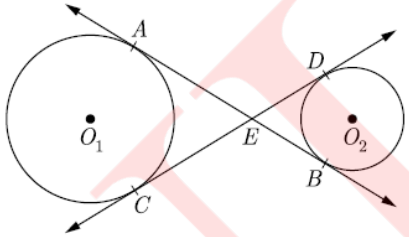
14. In the given figure, from a point P, two tangents PT and PS are drawn to a circle with centre O such that $\angle SPT = 120°$, prove that $OP = 2\,PS$.



15. In the given figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If $\angle PRQ = 120°$ then prove that $OR = PR + RQ$.

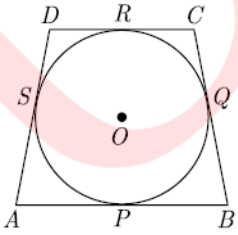


16. In the given figure, common tangents AB and CD to the two circle with centres O_1 and O_2 intersect at E. Prove that $AB = CD$.



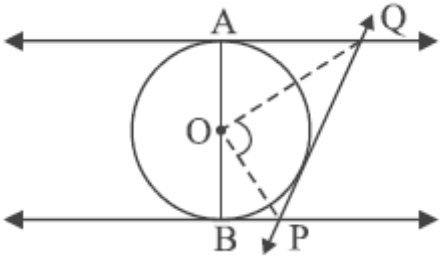
17. If a quadrilateral circumscribing a circle with centre O then prove that

$$AB + CD = BC + AD$$

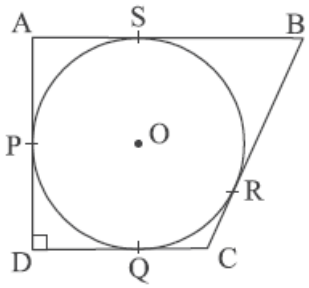


3 marks:

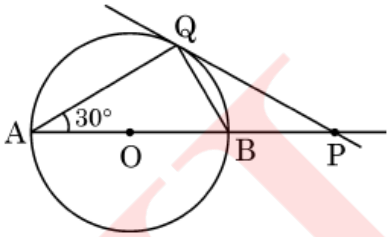
1. In the given figure, AB is a diameter of the circle with centre O. AQ, BP and PQ are tangents to the circle. Prove that $\angle POQ = 90°$. **[BOARD 2024]**



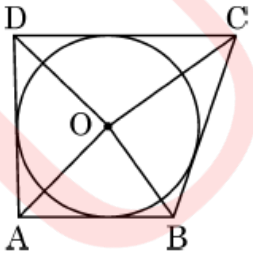
2. A circle with centre O and radius 8 cm is inscribed in a quadrilateral ABCD in which P, Q, R, S are the points of contact as shown. If AD is perpendicular to DC, $BC = 30\ cm$ and $BS = 24\ cm$ then find the length DC. **[BOARD 2024]**



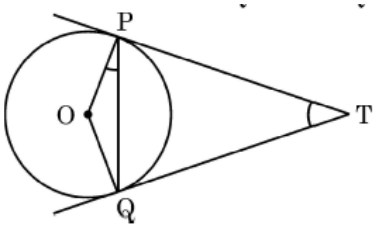
3. In the given figure, PQ is tangent to a circle centered at O and $\angle BAQ = 30°$. Show that $BP = BQ$. **[BOARD 2024]**



4. In the given figure, AB, BC, CD and DA are tangents to the circle with centre O forming a quadrilateral ABCD. Show that $\angle AOB + \angle COD = 180°$. **[BOARD 2024]**

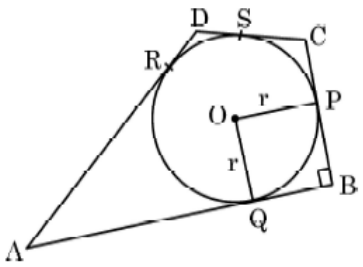


5. Prove that the tangents drawn at the end points of a chord of a circle makes equal angles with the chord. **[BOARD 2024]**
6. Prove that parallelogram circumscribing a circle is a rhombus. **[BOARD 2024]**
7. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$. **[BOARD 2023]**

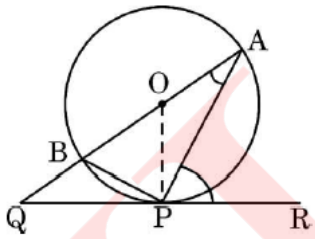


8. In the given figure, a circle is inscribed in a quadrilateral ABCD in which $\angle B = 90°$. If $AD = 17\ cm, AB = 20\ cm$ and $DS = 3\ cm$ then find the radius of the circle.

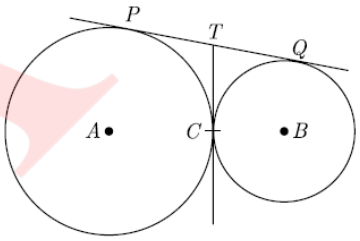
[BOARD 2023]



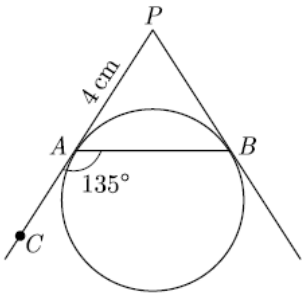
9. In the given figure, O is the centre of the circle and QPR is a tangent to it at P. Prove that $\angle QAP + \angle APR = 90°$. **[BOARD 2023]**



10. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre. **[BOARD 2023]**
11. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle. **[BOARD 2023]**
12. In the given figure, two circles touch each other at the point C. Prove that the common tangent to the circles at C, bisects the common tangent at P and Q.

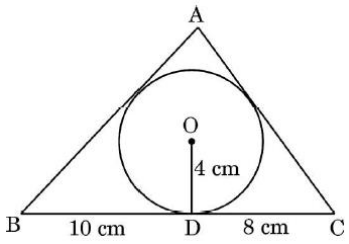


13. In the given figure, PA and PB are tangents to a circle from an external point P such that $PA = 4\,cm$ and $\angle BAC = 135°$. Find the length of the chord AB.

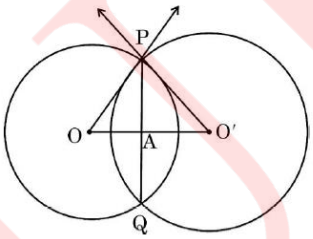


5 marks:

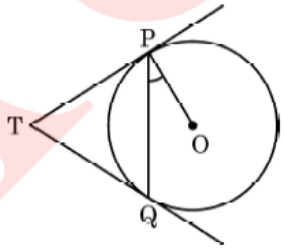
1. A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC are of lengths 10 cm and 8 cm respectively. Find the lengths of the sides AB and AC, if it is given that area $\Delta ABC = 90\ cm^2$. **[BOARD 2023]**



2. Two circles with centres O and O' of radii 6 cm and 8 cm respectively intersect at two points P and Q such that OP and O'P are tangents to the two circles. Find the length of the common chord PQ. **[BOARD 2023]**

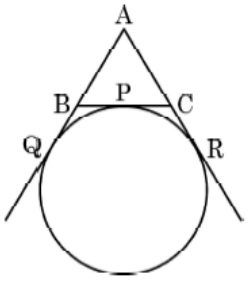


3. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$. **[BOARD 2023]**

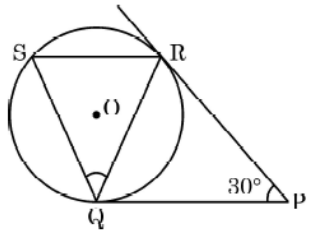


4. A circle touches the side BC of ΔABC at a point P and touches AB and AC when produced at Q and R respectively. Show that $AQ = \frac{1}{2}$(Perimeter of ΔABC).

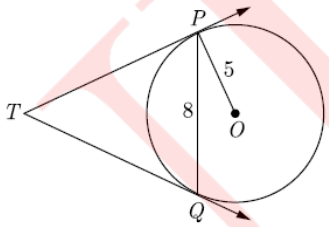
[BOARD 2023]



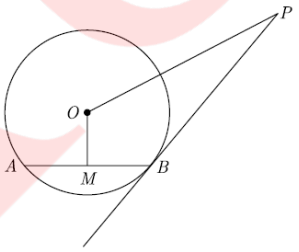
5. Prove that parallelogram circumscribing a circle is a rhombus. **[BOARD 2023]**
6. Prove that rectangle circumscribing a circle is a square.
7. In the given figure, tangents PQ and PR are drawn to a circle such that $\angle RPQ = 30°$. A chord RS is drawn parallel to the tangent PQ. Find the $\angle RQS$. **[BOARD 2023]**



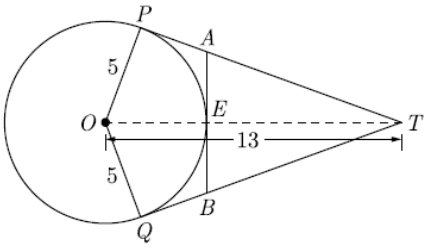
8. In the given figure, PQ is a chord of length 8 cm of circle of radius 5 cm with centre O. The tangents at P and Q intersect at a point T. Find the length of TP.



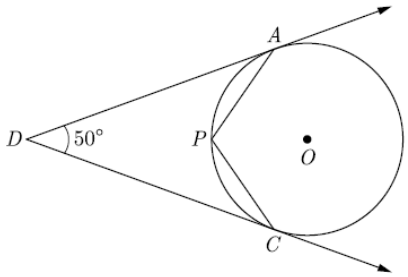
9. PB is a tangent to the circle with centre O to B. AB is a chord of length 24 cm at a distance of 5 cm from the centre. If the tangent is length 20 cm, then find the length of PO.



10. In the given figure, O is the centre of a circle of radius 5 cm. T is a point such that $OT = 13\ cm$ and OT intersects circle at E. If AB is a tangent to the circle at E, find the length of AB, where TP and TQ are two tangents to the circle.



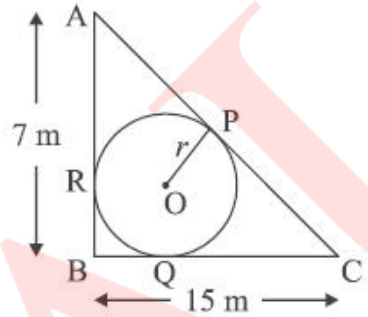
11. In the given figure, O is the centre of the circle. Determine $\angle APC$, if DA and DC are tangents and $\angle ADC = 50°$.

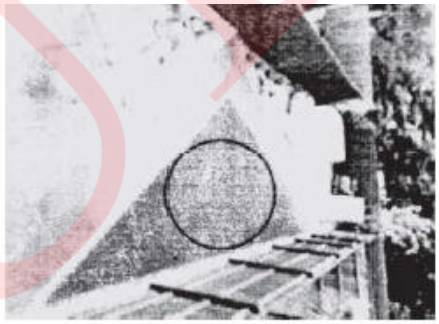


Case Based Questions:

1. A backyard is in the shape of a triangle ABC with right angle at B. $AB = 7\ cm$ and $BC = 15\ cm$. A circular pit was dug inside it such that it touches the walls AC, BC and AB at P, Q and R respectively such that $AP = x\ m$.

[BOARD 2024]





Based on the above information, answer the following questions:

(i) Find the length of AR in terms of x. **1**

(ii) (a) Find the length PC in term of x and hence find the value of x. **2**

OR

(b) Find x and hence find the radius r of the circle. **2**

(iii) Write the type of quadrilateral BQOR. **1**

GRADE X

Question Bank (MATHEMATICS)

Chapter-11 AREA RELATED TO CIRCLES

1 marks:

1. Perimeter of a sector of a circle whose central angle is 90° and radius 7 cm is **[BOARD 2024]**

   a) 35 cm b) 11 cm c) 22 cm d) 25 cm

2. The perimeter of the sector of a circle of radius 21 cm which subtends an angle of 60° at the centre of circle is **[BOARD 2024]**

   a) 22 cm b) 43 cm c) 64 cm d) 462 cm

3. If the area of the sector of a circle is $\frac{7}{20}$ of the area of the circle, then the angle at the centre is equal to **[BOARD 2024]**

   a) 110° b) 130° c) 100° d) 126°

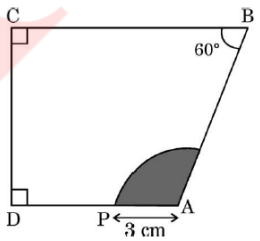
4. The area of the sector of a circle of radius 12 cm is $60\pi\ cm^2$. The central angle of this sector is **[BOARD 2024]**

   a) 120° b) 6° c) 75° d)150°

5. The length of an arc of a circle with radius 12 cm is $10\pi\ cm$. The angle subtended by the arc at the centre of the circle is **[BOARD 2024]**

   a) 120° b) 6° c) 75° d)150°

6. In the given figure, $\angle C = \angle D = 90°, \angle B = 60°$ and $AP = 3\ cm$ then the area of the shaded region is **[BOARD 2024]**



   a) $3\pi\ cm^2$ b) $6\pi\ cm^2$ c) $7\pi\ cm^2$ d) $9\pi\ cm^2$

7. What is the length of the arc of the sector of a circle with radius 14 cm and of central angle 90°? **[BOARD 2023]**

   a) 22 cm b) 44 cm c) 88 cm d) 11 cm

8. The hour hand of a clock is 6 cm long. The angle swept by it between 7:20 a.m and 7:55 a.m is **[BOARD 2023]**

   a) $\left(\frac{35}{4}\right)°$ b) $\left(\frac{35}{2}\right)°$ c) 35° d) 70°

9. The circumferences of two circles are in the ratio 4:5. What is the ratio of their radii? **[BOARD 2023]**

   a) $16:25$ b) $25:16$ c) $2:\sqrt{5}$ d) $4:5$

10. A sector is cut from a circular sheet of radius 100 cm, the angle of the sector being 240°. If another circle of the area same as the sector is formed, then the radius of the new circle is

    a) 79.5 cm b) 81.5 cm c) 83.4 cm d) 88.5 cm

11. The area of the circle that can be inscribed in a square of side 6 cm is

    a) $36\pi\ cm^2$ b) $18\pi\ cm^2$ c) $12\pi\ cm^2$ d) $9\pi\ cm^2$

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

12. ***Assertion (A):*** If the circumference of a circle is 176 cm, then its radius is 28 cm.
    Reason (R): Circumference $= 2\pi \times$ radius of a circle. **[BOARD 2024]**

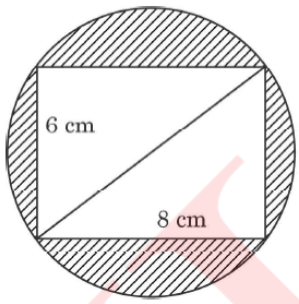
2 marks:

1. The minute hand of a clock is 14 cm long. Find the area on the face of the clock described by the minute hand is 5 minutes. **[BOARD 2024]**
2. Find the length of the arc of a circle which subtends an angle of 60° at the centre of the circle of radius 42 cm. **[BOARD 2024]**

3 marks:

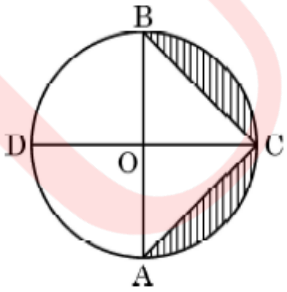
1. An arc of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding major sector. (Use $\pi = 3.14$) **[BOARD 2024]**
2. A sector is cut from a circle of radius 21 cm. The central angle of the sector is 150°. Find the length of the arc of this sector and the area of the sector. **[BOARD 2024]**
3. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find the area of the sector formed by the arc. Also, find the length of the arc. **[BOARD 2023]**

4. A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120°. Find the total area cleaned at each sweep of the two blades. **[BOARD 2023]**
5. Reeti prepares a Rakhi for her brother Ronit. The Rakhi consists of a rectangle of length 8 cm and breadth 6 cm inscribed in a circle as shown in the figure. Find the area of the shaded region. (Use $\pi = 3.14$) **[BOARD 2023]**

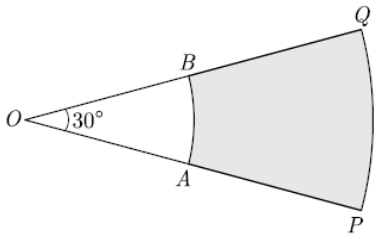


6. In the given figure, AB and CD are diameters of a circle with centre O perpendicular to each other. If $OA = 7\ cm$ find the area of shaded region.

[BOARD 2023]

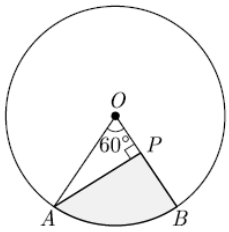


7. In the given figure, PQ and AB are two arcs of concentric circles of radii 7 cm and 3.5 cm respectively, with centre O. If $\angle POQ = 30°$ then the area of shaded region.

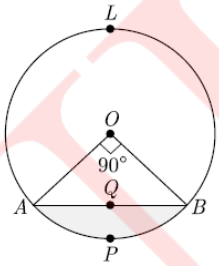


8. Three horses are tied each with 7 cm long rope at three corners of a triangular field having sides 20 m, 34 m and 42 m. Find the area of the plot which can be grazed by the horses.

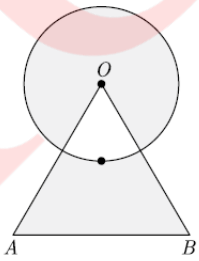
9. In the given figure, AOB is a sector of angle 60° of a circle with centre O and radius 17 cm. If $AP \perp OB$ and $AP = 15\,cm$ find the area of the shaded region.



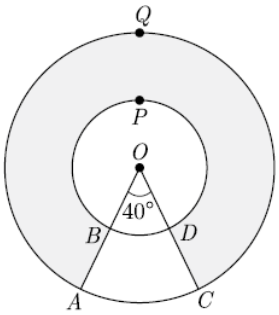
10. In the given figure, a chord AB of the circle with centre O and radius 10 cm, that subtends a right angle at the centre of the circle. Find the area of the minor segment AQBP. Hence find the area of major segment ALBQA. (Use π = 3.14).



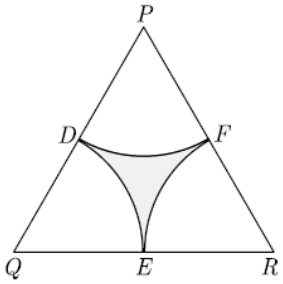
11. Find the area of shaded region shown in the figure, where a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.



12. In the given figure, find the area of shaded region enclosed between two concentric circles of radii 7 cm and 14 cm where $\angle AOC = 40°$.

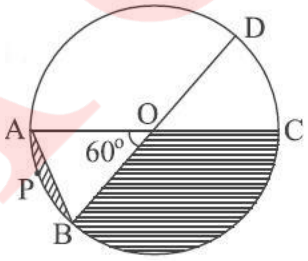


13. In the given figure, ΔPQR is an equilateral triangle of side 8 cm and D, E, F are centres of circular arcs each of radius 4 cm. Find the area of shaded region. (Use $\pi = 3.14$ and $\sqrt{3} = 1.732$)



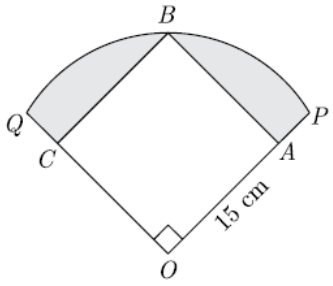
5 marks:

1. An arc of circle of radius 21 cm subtends an angle of 60° at the centre. Find the length of an arc and the area of the minor segment of the circle made by the corresponding chord. **[BOARD 2024]**
2. A chord of circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also find the area of major segment of the circle. **[BOARD 2023]**
3. In the given figure, diameters AC and BD of the circle intersect at O. If $\angle AOB = 60°$ and $OA = 10\,cm$ then find the length of the chord AB and find the area of the shaded region. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$) **[BOARD 2024]**



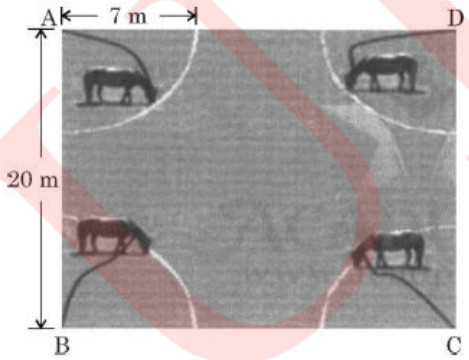
4. The perimeter of a certain sector of a circle of radius 5.6 m is 20 m. Find the area of the sector. **[BOARD 2024]**
5. A horse is tied to a beg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find the area of that part of the field in which the horse can graze. Also, find the increase in grazing area if length of the rope is increased to 10 m. (Use $\pi = 3.14$) **[BOARD 2023]**

6. In the given figure, a square OABC is inscribed in a quadrant OPBQ. If $OA = 15\ cm$ find the area of the shaded region. (Use $\pi = 3.14$).



Case Based Questions:

1. A stable owner has four horses. He usually tie these horses with 7 m long rope to pegs at each corner of a square shaped grass field of 20 m length, to graze in his farm. But tying with rope sometimes results in injuries to his horses, so he decided to build fence around the area so that each horse can graze. **[BOARD 2024]**



Based on the above information, answer the following questions:

(i) Find the area of the square shaped grass field. **1**

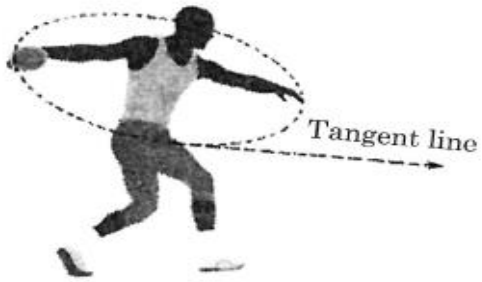
(ii) (a) Find the area of the total field in which these horses can graze. **2**

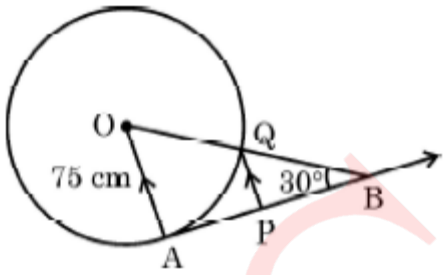
OR

(b) If the length of the rope of each horse is increased from 7 m to 10 m, find the area grazed by one horse. (Use $\pi = 3.14$) **2**

(iii) What is the area of the field that is left un grazed, if the length of the rope of each horse is 7 m? **1**

2. The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anti clockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit. **[BOARD 2023]**





In the given figure, AB is one such tangent to a circle of radius 75 cm. Point O is centre of the circle and $\angle ABO = 30°$. PQ is parallel to OA.

Based on the above information:

(i) Find the length of AB. **1**

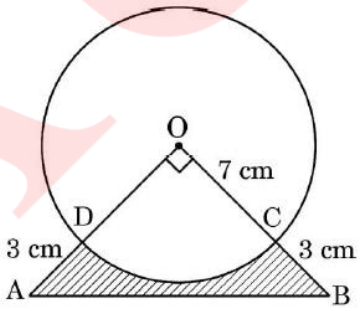
(ii) (a) Find the length of AP. **2**

OR

(b) Find the length of PQ. **2**

(iii) Find the length of OB. **1**

3. In an annual day function of a school, the organizers wanted to give a cash prize along with a memento to their best students. Each memento is made as shown in the figure and its base ABCD is shown from the front side. The rate of silver plating is Rs 20 per cm^2. **[BOARD 2023]**



Based on the above, answer the following questions:

(i) What is the area of the quadrant ODCO? **1**

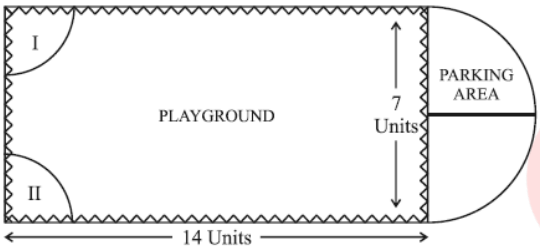
(ii) (a) What is the total cost of silver plating the shaded part ABCD? **2**

OR

(b) What is the length of arc CD? **2**

(iii) Find the area of ΔAOB. **1**

4. Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.



After survey, it was decided to build rectangular playground, with a semi-circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.

Based on the above, answer the following questions:

(i) What is the total perimeter of the parking area? **1**

(ii) (a) What is the total area of parking and the two quadrants? **2**

(OR)

(b) What is the ratio of area of playground to the area of parking area? **2**

(iii) Find the cost of fencing the playground and parking area at the rate of Rs 2 per unit. **1**

GRADE X

Question Bank (MATHEMATICS)

Chapter-12 SURFACE AREA AND VOLUMES

1 marks:

1. A solid sphere is cut into two hemispheres. The ratio of the surface areas of sphere to that of two hemispheres taken together, is **[BOARD 2024]**

   a) 1:1 b) 1:4 c) 2:3 d) 3:2

2. The volume of the largest right circular cone that can be carved out from a solid cube of edge 2 cm is **[BOARD 2024]**

   a) $\frac{4\pi}{3}cm^3$ b) $\frac{5\pi}{3}\ cm^3$ c) $\frac{8\pi}{3}\ cm^3$ d) $\frac{2\pi}{3}\ cm^3$

3. The ratio of total surface area of a solid hemisphere to the square of its radius is **[BOARD 2024]**

   a) $2\pi:1$ b) $4\pi:1$ c) $3\pi:1$ d)$1:4\pi$

4. Two identical solid cubes of side 'a' are joined end to end. The total surface area of the resulting cuboid is **[BOARD 2024]**

   a) $6a^2$ b) $10a^2$ c) $5a^2$ d) $4a^2$

5. Curved surface area of a cylinder of height 5 cm is 94.2 cm^2. Radius of the cylinder is (Take $\pi = 3.14$) **[BOARD 2023]**

   a) 2 cm b) 3 cm c) 2.9 cm d) 6 cm

6. The curved surface area of a cone having height 24 cm and radius 7 cm, is **[BOARD 2023]**

   a) 528 cm^2 b) 1056 cm^2 c) 550 cm^2 d) 500 cm^2

7. The area of metal sheet required to make a closed hollow cylinder of height 2.4 m and base radius 0.7 m, is **[BOARD 2023]**

   a) 10.56 m^2 b) 13.52 m^2 c) 13.64 m^2 d) 14.08 m^2

8. What is the total surface area of a solid hemisphere of diameter 'd'? **[BOARD 2023]**

   a) $3\pi d^2$ b) $2\pi d^2$ c) $\frac{1}{2}\pi d^2$ d) $\frac{3}{4}\pi d^2$

9. What is the area of a semi circle of diameter 'd'? **[BOARD 2023]**

   a) $\frac{1}{16}\pi d^2$ b) $\frac{1}{4}\pi d^2$ c) $\frac{1}{8}\pi d^2$ d) $\frac{1}{2}\pi d^2$

10. If the area of the base of a cone is 51 cm^2 and its volume is 85 cm^3 then the vertical height of the cone is given as **[BOARD 2023]**

    a) $\frac{5}{6}\ cm$ b) $\frac{5}{3}\ cm$ c) $\frac{5}{2}\ cm$ d) 5 cm

11. Water in a river which is 3 m deep and 40 m wide is flowing at the rate of 2 km/hr. How much water will fall into the sea in 2 minutes? **[BOARD 2023]**

a) 800 m^3 b) 4000 m^3 c) 8000 m^3 d) 2000 m^3

12. The volume of right circular cone whose area of the base is 156 cm^2 and the vertical height is 8 cm, is **[BOARD 2023]**

a) 2496 cm^3 b) 1248 cm^3 c) 1664 cm^3 d) 416 cm^3

13. If the radius of the sphere is increased by 100% the volume of the corresponding sphere is increased by

a) 200% b) 500% c) 700% d) 800%

14. If the radius of a circle is diminished by 10% then its area is diminished by

a) 10% b) 19% c) 36% d) 20%

15. The base radii of a cone and a cylinder are equal. If their CSA are also equal, thyen the ratio of the slant height of the cone to the height of the cylinder is

a) 2:1 b) 1:2 c) 1:3 d) 3:1

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

16. ***Assertion (A):*** Two cubes each of edge length 10 cm are joined together. The total surface area of newly formed cuboid is 1200 cm^2.

Reason (R): Area of each surface of a cube of side 10 cm is 100 cm^2. **[BOARD 2024]**

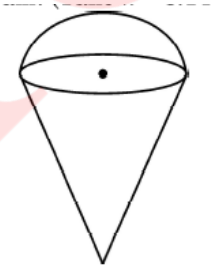
17. ***Assertion (A):*** Total surface area of the top is the sum of the curved surface area of the hemisphere and the curved surface area of the cone.

Reason (R): Top is obtained by fixing the plane surfaces of the hemisphere and cone together. **[BOARD 2023]**

3 marks:

1. The difference between the outer and inner radii of a hollow right circular cylinder of length 14 cm is 1 cm. If the volume of the metal used in making the cylinder is 176 cm^3, find the outer and inner radii of the cylinder. **[BOARD 2024]**
2. A wooden toy is made by scooping out a hemisphere of same radius as of cylinder, from each end of a wooden solid cylinder. If the height of the cylinder is 20 cm and its base is of radius 7 cm, find the total surface area of the toy. **[BOARD 2024]**
3. The inner and outer radii of a hollow cylinder surmounted on a hollow hemisphere of same radii are 3 cm and 4 cm respectively. If height of the cylinder is 14 cm, then find its total surface area (inner and outer). **[BOARD 2024]**
4. A room is in the form of cylinder surmounted by a hemispherical dome. The base radius of hemisphere is one half the height of cylindrical part. Find the total height of the room if it contains $\left(\frac{1408}{21}\right) m^3$ of air. $\left(\text{Take } \pi = \frac{22}{7}\right)$ **[BOARD 2023]**
5. An empty cone of its radius 3 cm and height 12 cm. Ice cream is filled in it so that lower part of the cone which is $\left(\frac{1}{6}\right)^{th}$ of the volume of the cone is unfilled but hemisphere is formed on the top. Find the volume of the ice cream. (Take $\pi = 3.14$)

[BOARD 2023]

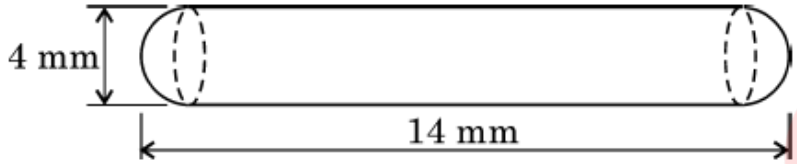


5 marks:

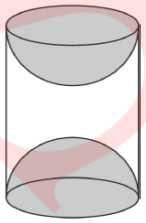
1. A vessel is in the form of hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area and the volume of the vessel. **[BOARD 2024]**
2. A solid iron pole consists of a solid cylinder of height 200 cm and base diameter 28 cm, which surmounted by another cylinder of height 50 cm and radius 7 cm. Find the mass of the pole, given that 1 cm^3 of iron pole has approximately 8 g mass.

[BOARD 2024]

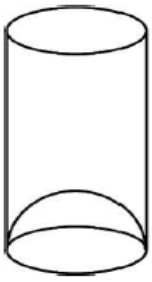
3. A medicine capsule is in the shape of cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 4 mm, find its surface area. Also find its volume. **[BOARD 2024]**



4. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 5.8 cm and its base is of radius 2.1 cm, find the total surface area of the article. **[BOARD 2023 & BOARD 2024]**

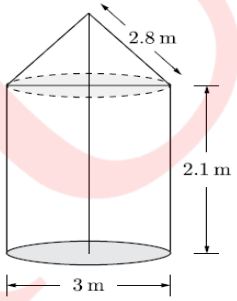


5. A tent is in the shape of a cylinder, surmounted by a conical top. If the height and diameter of the cylindrical part are 3.5 m and 6 m, and slant height of the top is 4.2 m, find the area of canvas used for making the tent. Also, find the cost of canvas of the tent at the rate of Rs 500 per m^2. **[BOARD 2024]**
6. A juice seller was serving his customers using glasses as shown in the figure. The inner diameter of the cylindrical glass was 5.6 cm, but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of the glass was 10 cm, find the apparent capacity and the actual capacity of the glass. **[BOARD 2024]**



7. A stduents was asked to make a model shaped like a cylinder with two cones attached to its ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its total length is 12 cm. If each cone has a slant height of 2 cm, find the volume of air contained in the model. **[BOARD 2023]**
8. From a solid cylinder of height 20 cm and diameter 12 cm, a conical cavity of height 8 cm and radius 6 cm is hollowed out. Find the total surface area of the remaining solid. **[BOARD 2023]**
9. A solid is in the shape of a right circular cone surmounted on a hemisphere, the radius of each of them being 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid. **[BOARD 2023]**

10. Water is flowing at the rate of 15 km/hr through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in pond rise by 21 cm? What should be the speed of water if the rise in water level is to be attained in 1 hour?
11. A solid is in the shape of a cone mounted on a hemisphere of same base radius. If CSA of the hemispherical part and the conical part are equal, then find the ratio of the radius and the height of the conical part.
12. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/hr. How much area will it irrigate in 30 minutes, if 8 cm standing water is needed?
13. A right triangle whose sides are 20 cm and 15 cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. (Use $\pi = 3.14$).
14. A tent is in shape of cylinder surmounted by a conical top of same diameter. If the height and diameter of cylindrical part are 2.1 m and 3 m respectively and the slant height of conical part is 2.8 m, find the cost of canvas needed to make the tent if the canvas is available at the rate of Rs 500 per square meter.



Case Based Questions:

1. The word 'circus' has the same root as 'circle'. In a closed circular area, various entertainment acts including human skill and animal training are presented before the crowd. A circus tent is cylindrical up to a height of 8 m and conical above it. The diameter of the base is 28 m and total height of tent is 18.5 m. **[BOARD 2024]**

Based on the above information, answer the following questions:

(i) Find the slant height of the conical part. **1**

(ii) (a) Find area of the cloth used for making tent. **2**

OR

(b) Find total volume of air inside an empty tent. **2**

(iii) Determine the floor area of the tent. **1**

2. Tamper proof tetra packed milk guarantees both freshness and security. This milk ensures uncompromised quality, preserving the nutritional values within and making it a reliable choice for health conscious individuals. **[BOARD 2024]**

500 ml milk is packed in a cuboidal container of dimensions $15\ cm \times 8\ cm \times 5\ cm$. These milk packets are then packed in cuboidal cartons of dimensions $30\ cm \times 32\ cm \times 15\ cm$.

Based on the above given information, answer the following questions:

(i) Find the volume of the cuboidal cartion. **1**

(ii) (a) Find the total surface area of a milk packet. **2**

OR

(b) How many milk packets can be filled in a carton? **2**

(iii) How much milk can the cup (as shown in the figure) hold? **1**

3. In a coffee shop, coffee is served in two types of cups. One is cylindrical in shape with diameter 7 cm and height 14 cm and other is hemispherical with diameter 21 cm. **[BOARD 2023]**

Based on the above information answer the following:

(i) Find the area of the base of the cylindrical cup. **1**

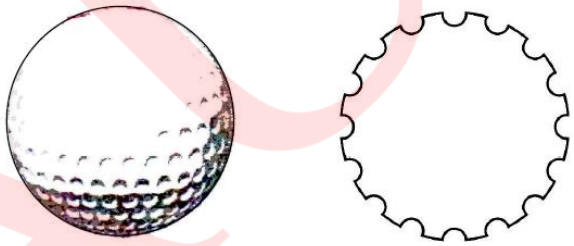
(ii) What is the capacity of the hemispherical cup? **2**

OR

Find the capacity of cylindrical cup? **2**

(iii) What is the curved surface area of the cylindrical cup? **1**

4. A golf ball is spherical with about 300-500 dimples that help increase its velocity while in play. Golf balls are traditionally while but available in colours also. In the given figure, a golf ball has diameter 4.2 cm and the surface has 315 dimples (hemi-spherical) of radius 2 mm. **[BOARD 2023]**



Based on the above, answer the following questions:

(i) Find the surface area of one such dimple. **1**

(ii) Find the volume of the material dug out to make one dimple. **1**

(iii) (a) Find the total surface area exposed to the surroundings. **2**

(OR)

(b) Find the volume of the gold ball. **2**

GRADE X

Question Bank (MATHEMATICS)

Chapter-13 STATISTICS

1 marks:

1. For some data $x_1, x_2, x_3, \ldots x_n$ with respective frequencies $f_1, f_2, f_3, \ldots, f_n$, the value of $\sum_1^n f_i(x_i - \bar{x})$ is equal to **[BOARD 2024]**

   a) $n\bar{x}$ b) 1 c) $\sum f_i$ d) 0

2. The middle most observation of every data arranged in order is called **[BOARD 2024]**

   a) mean b) median c) mode d) deviation

3. If the value of each observation in a data is increased by 2, then median of the new data **[BOARD 2024]**

   a) Increases by 2 c) increases by 2n

   b) Remains same d) decreases by 2

4. If the value of each observation of a statistical data is increased by 3, then mean of the data **[BOARD 2023]**

   a) Remains unchanged c) increase by 3

   b) Increase by 6 d) increase by 3n

5. After an examination, a teacher wants to know the marks obtained by maximum number of the students in her class. She requires to calculate _____ of marks. **[BOARD 2024]**

   a) mean b) median c) mode d) range

6. The mean of 5 observations is 15. If the mean of first three observations is 14 and that of the last three observations is 17, then the third observation is

   a) 20 b) 19 c) 18 d) 17

7. If the mean five observations $x, x+2, x+4, x+6$ and $x+8$ is 11, then the value of x is **[BOARD 2024]**

   a) 4 b) 7 c) 11 d) 6

8. For the data $2, 9, x+6, 2x+3, 5, 10, 5$ if the mean is 7, then the value of x is **[BOARD 2024]**

   a) 9 b) 6 c) 5 d) 3

9. The mean of 5 numbers is 15. If we include one more number, the mean of six numbers becomes 17. The included number is **[BOARD 2024]**

a) 27 b) 37 c) 17 d) 25s

10. The empirical relation between the mode, median and mean of a distribution is **[BOARD 2023]**

a) Mode = 3 Median − 2 Mean
b) Mode = 2 Median − 3 Mean
c) Mode = 3 Mean − 2 Median
d) Mode = 2 Mean − 3 Median

11. If the difference of mode and median of a data is 24, then the difference of its median and mean is **[BOARD 2024]**

a) 12 b) 24 c) 8 d) 36

12. If the mean and mode of a data are 24 and 12 respectively, then its median is **[BOARD 2024]**

a) 25 b) 18 c) 20 d) 22

13. If the mean and median of a data are 12 and 15 respectively, then its mode is **[BOARD 2023]**

a) 13.5 b) 21 c) 6 d) 14

14. If the mean of 6, 7, p, 8, q, 14 is 9 then **[BOARD 2024]**

a) $p - q = 19$ b) $p + q = 19$ c) $p - q = 21$ d) $p + q = 21$

15. If the mean of the first n natural numbers is $\frac{5n}{9}$ then the value of n is **[BOARD 2024]**

a) 5 b) 4 c) 9 d) 10

16. The distribution below gives the marks obtained by 80 students on a test:

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60
Number of students	3	12	27	57	75	80

The modal class of this distribution is **[BOARD 2023]**

a) 10-20 b) 20-30 c) 30-40 d) 50-60

17. For the following distribution:

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

The sum of lower limits of median class and modal class is: **[BOARD 2023]**

a) 15 b) 25 c) 30 d) 35

18. In a frequency distribution, the mid value of a class is 10 and the width of the class is 6. The lower limit of the class is

a) 6 b) 7 c) 8 d) 12

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

2 marks:

1. The mode of the following frequency distribution is 36. Find the missing frequency f.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	8	10	f	16	12	6	7

3 marks:

1. In a test, the marks obtained by 100 students (out of 50) are given below.

Marks obtained	0-10	10-20	20-30	30-40	40-50
Number of students	12	23	34	25	6

Find the mean marks of the students. **[BOARD 2024]**

2. Find the mean of the following: **[BOARD 2023]**

Class	0-15	15-30	30-45	45-60	60-75	75-90
Frequency	17	20	18	21	15	9

3. Find the median of the following data:

Height (in cm)	Less than 120	Less than 140	Less than 160	Less than 180	Less than 200
Number of students	12	26	34	40	50

4. Find the mean of the following distribution:

Height (in cm)	**No of students**
Less than 75	5
Less than 100	11
Less than 125	14
Less than 150	18
Less than 175	21
Less than 200	28
Less than 225	33
Less than 250	37
Less than 275	45
Less than 300	50

5 marks:

1. The following table shows the ages of the patients admitted in a hospital during a year.

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of patients	6	11	21	23	14	5

Find the mode and mean of the data given above. **[BOARD 2024]**

2. Find the mean of the following frequency distribution: **[BOARD 2024]**

Class	25-30	30-35	35-40	40-45	45-50	50-55	55-60
Frequency	14	22	16	6	5	3	4

3. The following distribution shows the daily pocket allowance of children of a locality. The mean daily pocket allowance is Rs 36.10. Find the missing frequency f.

[BOARD 2024]

Daily pocket allowance (in Rs)	20-25	25-30	30-35	35-40	40-45	45-50	50-55
Number of children	7	6	9	13	f	5	4

4. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarised it in the table given below. Find the mean and median of the following data. **[BOARD 2023]**

Number of cars	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency (periods)	7	14	13	12	20	11	15	8

5. The mode of the following frequency distribution is 55. Find the missing frequencies 'a' and 'b'. **[BOARD 2023]**

Class Interval	0-15	15-30	30-45	45-60	60-75	75-90	Total
Frequency	6	7	a	15	10	b	51

6. The monthly expenditure on milk in 200 families of a housing society is given below: **[BOARD 2023]**

Monthly Expenditure (in Rs)	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	4500-5000
Number of families	24	40	33	x	30	22	16	7

Find the value of x and also find median and mean expenditure on milk.

7. 250 apples of a box were weighed and the distribution of masses of the apples is given in the following table: **[BOARD 2023]**

Mass (in grams)	80-100	100-120	120-140	140-160	160-180
Number of Apples	20	60	70	x	60

(i) Find the value of x and the mean mass of the apples. **3**

(ii) Find the modal mass of the apples. **2**

8. The mean of the following distribution is 48 and sum of all the frequency is 50. Find the missing frequencies x and y.

Class	20-30	30-40	40-50	50-60	60-70
Frequency	8	6	x	11	y

9. If the median of the following frequency distribution is 32.5. Find the values of x and y.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	x	5	9	12	y	3	2	40

Case Based Questions:

1. BINGO is game of chance. The host has 75 balls numbered 1 through 75. Each player has a BINGO card with some numbers written on it. The participants cancels the number on the card when called out a number written on the ball selected at random. Whosoever cancels all the numbers on his/her card, says BINGO and wins the game. **[BOARD 2024]**

The table given below, shows the data of one such game where 48 balls were used before Tara said 'BINGO'.

Numbers announced	Number of times
0-15	8
15-30	9
30-45	10
45-60	12
60-75	9

Based on the above information, answer the following questions:

(i) Write the median class. **1**

(ii) (a) Find the median of the given data. **2**

OR

(b) Find the mode of the given data. **2**

(iii) When first ball was picked up, what was the probability of calling out an even number? **1**

2. Vocational training complements traditional education by providing practical skills and hands-on experience. While education equips individuals with a broad knowledge base, vocational training focuses on job-specific skills, enhancing employability thus making the student self-reliant. Keeping this in view, a teacher

made the following table giving the frequency distribution of students/adults undergoing vocational training from the training institute. **[BOARD 2024]**

Age (in years)	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
Number of participants	62	132	96	37	13	11	10	4

From the above answer the following:

(i) What is the lower limit of the modal class of the above data? **1**

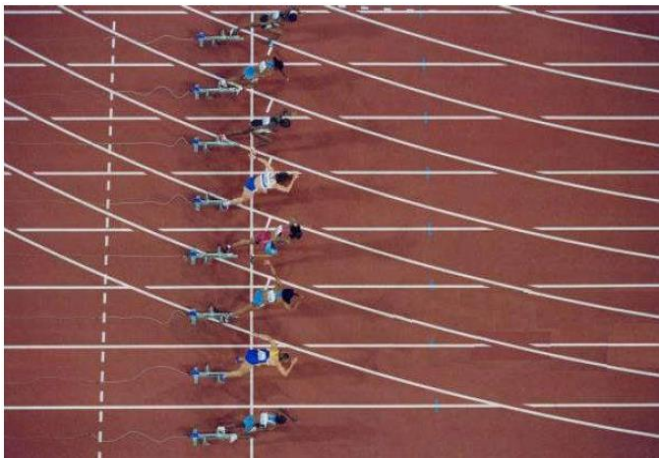
(ii) (a) Find the median class of the above data? **2**

OR

(b) Find the number of participants of age less than 50 years who undergo vocational training. **2**

(iii) Write the empirical relationship between mean, median and mode. **1**

3. Activities like running or cycling reduce stress and the risk of mental disorders like depression. Running helps build endurance. Children develop stronger bones and muscles and are less prone to gain weight. The physical education teacher of a school has decided to conduct an inter school running tournament in his school premises. The time taken by a group of students to run 100 m, was noted as follows. **[BOARD 2024]**



Time (in seconds)	0-20	20-40	40-60	60-80	80-100
Number of students	8	10	13	6	3

From the above answer the following:

(i) What is the median class of the above data? **1**

(ii) (a) Find the mean time taken by the students to finish the race. **2**

OR

(b) Find the mode of the above given data. **2**

(iii) How many students took time less than 60 seconds? **1**

4. India meteorological department observes seasonal and annual rainfall every year in different sub divisions of our country. **[BOARD 2023]**

Rainfall (mm)	Number of Sub-divisions
200-400	2
400-600	4
600-800	7
800-1000	4
1000-1200	2
1200-1400	3
1400-1600	1
1600-1800	1

It helps them to compare and analyze the results. The table given above shows sub division wise seasonal (monsoon) rainfall (mm) in 2018.

Based on the above information, answer the following questions:

(i) Write the modal class. **1**

(ii) (a) Find the median of the given data. **2**

OR

(b) Find the mean rainfall in this season. **2**

(iii) If subdivision having at least 1000 mm rainfall during monsoon season, is considered good rainfall subdivision, then how many subdivisions had good rainfall? **1**

GRADE X

Question Bank (MATHEMATICS)

Chapter-14 PROBABILITY

1 marks:

1. If the probability of the player winning a game is 0.79, then the probability of his losing the same game is **[BOARD 2024]**

   a) 1.79 b) 0.31 c) 0.21% d) 0.21

2. Two dice are rolled together. The probability of getting sum of numbers on two dice as 2, 3 or 5 is **[BOARD 2024]**

   a) $\frac{7}{36}$ b) $\frac{11}{36}$ c) $\frac{5}{36}$ d) $\frac{4}{9}$

3. Two dice are rolled together. The probability of getting sum of two numbers to be more than 10 is **[BOARD 2024]**

   a) $\frac{1}{9}$ b) $\frac{1}{6}$ c) $\frac{7}{12}$ d) $\frac{1}{12}$

4. Two dice are thrown together. The probability that they show different numbers is **[BOARD 2024]**

   a) $\frac{1}{6}$ b) $\frac{5}{6}$ c) $\frac{1}{3}$ d) $\frac{2}{3}$

5. Two dice are thrown together. The probability of getting the difference of numbers on their upper faces equals to 3 is **[BOARD 2023]**

   a) $\frac{1}{9}$ b) $\frac{2}{9}$ c) $\frac{1}{6}$ d) $\frac{1}{12}$

6. Two dice are tossed simultaneously. The probability of getting odd numbers on both the dice is **[BOARD 2024]**

   a) $\frac{6}{36}$ b) $\frac{3}{36}$ c) $\frac{12}{36}$ d) $\frac{9}{36}$

7. In a single throw of two dice, the probability of getting 12 as a product of two numbers obtained is: **[BOARD 2023]**

   a) $\frac{1}{9}$ b) $\frac{2}{9}$ c) $\frac{4}{9}$ d) $\frac{5}{9}$

8. Which of the following is not a probability of an event? **[BOARD 2024]**

   a) 0.89 b) 52% c) $\frac{1}{13}$% d) $\frac{1}{0.89}$

9. One card is drawn at random from a well shuffled deck of 52 cards. The probability that it is a red ace card is **[BOARD 2024]**

a) $\frac{1}{13}$ b) $\frac{1}{26}$ c) $\frac{1}{52}$ d) $\frac{1}{2}$

10. A card is drawn at random from a well-shuffled pack of 52 cards. The probability that the card drawn is not an ace is **[BOARD 2023]**

a) $\frac{1}{13}$ b) $\frac{9}{13}$ c) $\frac{4}{13}$ d) $\frac{12}{13}$

11. From the data 1, 4, 7, 9, 16, 21, 25 if all the even numbers are removed, then the probability of getting at random a prime number from the remaining is **[BOARD 2024]**

a) $\frac{2}{5}$ b) $\frac{1}{5}$ c) $\frac{1}{7}$ d) $\frac{2}{7}$

12. If a digit is chosen at random from the digits 1, 2, 3, 4, 5, 6, 7, 8, 9 then the probability that this digit is an odd prime number is **[BOARD 2024]**

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{4}{9}$ d) $\frac{5}{9}$

13. A box contains cards numbered 6 to 55. A card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square is **[BOARD 2024]**

a) $\frac{7}{50}$ b) $\frac{7}{55}$ c) $\frac{1}{10}$ d) $\frac{5}{49}$

14. One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is a multiple of 7 is **[BOARD 2024]**

a) $\frac{1}{7}$ b) $\frac{1}{8}$ c) $\frac{1}{5}$ d) $\frac{7}{40}$

15. A bag contains 3 red balls, 5 white balls and 7 black balls. The probability that a ball drawn from the bag at random will be neither red nor black is **[BOARD 2024]**

a) $\frac{1}{3}$ b) $\frac{1}{5}$ c) $\frac{7}{15}$ d) $\frac{8}{15}$

16. A bag contains 5 red balls and n green balls. If the probability of drawing a green ball is three times that of a red ball, then the value of n is **[BOARD 2023]**

a) 18 b) 15 c) 10 d) 20

17. The probability of guessing the correct answer to a certain test question is $\frac{x}{6}$. If the probability of not guessing the correct answer to this question is $\frac{2}{3}$ then the value of x is **[BOARD 2024]**

a) 2 b) 3 c) 4 d) 6

18. The probability of getting a bad egg in a lot of 400 eggs is 0.045. The number of good eggs in the lot is **[BOARD 2024]**

a) 18 b) 180 c) 382 d) 220

19. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought? **[BOARD 2023]**

a) 40 b) 240 c) 480 d) 750

20. In a group of 20 people, 5 can't swim. If one person is selected at random then the probability that he/she can swim is **[BOARD 2023]**

a) $\frac{3}{4}$ b) $\frac{1}{3}$ c) $\frac{1}{4}$ d) 1

21. From the letters of the word "MOBILE", a letter is selected at random. The probability that the selected letter is vowel is **[BOARD 2024]**

a) $\frac{3}{7}$ b) $\frac{1}{6}$ c) $\frac{1}{2}$ d) $\frac{1}{3}$

22. For an event E, if $P(E) + P(\bar{E}) = q$, then the value of $q^2 - 4$ is **[BOARD 2024]**

a) -3 b) 3 c) 5 d) -5

23. Probability of happening of an event is denoted by p and probability of non-happening of the event is denoted by q. Relation between p and q is **[BOARD 2023]**

a) $p + q = 1$ b) $p = 1, q = 1$ c) $p = q - 1$ d) $p + q + 1 = 0$

24. In a lottery, there are 5 prizes and 20 blanks. The probability of getting a prize is **[BOARD 2023]**

a) $\frac{1}{4}$ b) $\frac{1}{20}$ c) $\frac{1}{25}$ d) $\frac{1}{5}$

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

a) Assertion (A) is false but reason (R) is true

25. ***Assertion (A):*** In a cricket match, a batsman hits a boundary 9 times out of 45 balls he plays. The probability that in a given ball, he does not hit the boundary is $\frac{4}{5}$.

Reason (R): $P(E) + P(\bar{E}) = 1$. **[BOARD 2024]**

26. ***Assertion (A):*** The probability that a leap year has 53 Sundays is $\frac{2}{7}$.

Reason (R): The probability that a non-leap year has 53 Sundays is $\frac{5}{7}$.

[BOARD 2023]

2 marks:

1. In a pack of 52 playing cards one card is lost. From the remaining cards, a card is drawn at random. Find the probability that the drawn card is queen of heart, if the lost card is a black card. **[BOARD 2024]**
2. One card is drawn at random from a well shuffled deck of 52 cards. Find the probability that the card drawn
   (i) is queen of hearts
   (ii) is not a jack. **[BOARD 2024]**
3. The king, queen and ace of clubs and diamonds are removed from a deck of 52 playing cards and the remaining cards are shuffled. A card is randomly drawn from the remaining cards. Find the probability of getting
   (i) A card of clubs
   (ii) A red coloured card. **[BOARD 2024]**
4. A carton consists of 60 shirts of which 48 are good, 8 have major defects and 4 have minor defects. Nigam, a trader will accept the shirts which are good but Anmol, another trader will only reject the shirts which have major defects. One shirt is drawn at random from the carton. Find the probability that it is acceptable to Anmol. **[BOARD 2024]**
5. A bag contains 4 red, 3 blue and 2 yellow balls. One ball is drawn at random from the bag. Find the probability that drawn ball is (i) red (ii) yellow. **[BOARD 2023]**
6. A fair coin tossed twice, find the probability of getting at most one head? **[BOARD 2023]**

3 marks:

1. Three coins are tossed simultaneously. What is the probability of getting
   (i) At least one head?
   (ii) Exactly two tails?
   (iii) At most one tail? **[BOARD 2024]**
2. A box contains 90 discs which are numbered 1 to 90. If one disc is drawn at random from the box, find the probability that it bears a

(i) 2-digit number less than 40.

(ii) Number divisible by 5 and greater than 50.

(iii) A perfect square. **[BOARD 2024]**

3. Three unbiased coins are tossed simultaneously. Find the probability of getting

(i) At least one head

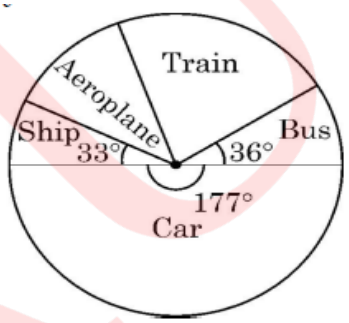
(ii) Exactly one tail

(iii) Two heads and one tail. **[BOARD 2024]**

4. A jar contains 54 marbles, each of which is blue, green or white. The probability of selecting a blue marble at random from the jar is $\frac{1}{3}$, and the probability of selecting a green marble at random is $\frac{4}{9}$. How many white marbles does this jar contain? **[BOARD 2024]**

Case Based Questions:

1. In a survey on holidays, 120 people were asked to state which type of transport they used on their last holiday. The following pie chart shows the results of the survey. **[BOARD 2024]**



Observe the pie chart and answer the following questions:

(i) If one person is selected at random, find the probability that he/she travelled by bus or ship. **1**

(ii) A person is selected at random. If the probability that he did not use train is $\frac{4}{5}$, find the number of people who used train. **2**

OR

The probability that randomly selected person used aeroplane is $\frac{7}{60}$. Find the revenue collected by air company at the rate of Rs 5,000 per person. **2**

(iii) Which is most favorite mode of transport and how many people used it? **1**

2. Computer-based learning (CBL) refers to any teaching methodology that makes use of computers for information transmission. At an elementary school level, computer applications can be used to display multimedia lesson plans. A survey was done on 1000 elementary and secondary schools of Assam and they were classified by the number of computers they had. **[BOARD 2023]**

Number of Computers	1 – 10	11 – 20	21 – 50	51 – 100	101 and more
Number of Schools	250	200	290	180	80

One school is chosen at random. Then:

(i) Find the probability that the school chosen at random has more than 100 computers. **1**

(ii) Find the probability that the school chosen at random has 50 or fewer computers. **2**

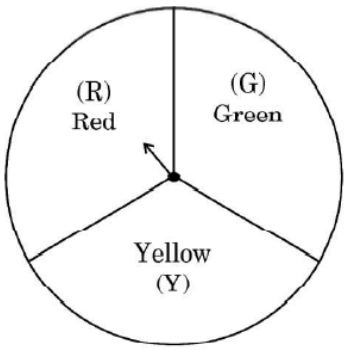
OR

Find the probability that the school chosen at random has no more than 20 computers. **2**

(iii) Find the probability that the school chosen at random has 10 or less than 10 computers. **1**

3. A middle school decided to run the following spinner game as a fund-raiser on Christmas carnival.

Making purple: Spin each spinner once. Blue and red make purple. So, if one spinner shows Red (R) and another Blue (B) then you 'win'. One such outcome is written as 'RB'. **[BOARD 2023]**



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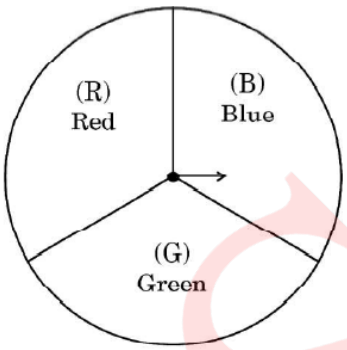


II

Based on the above information, answer for the following questions:

(i) List all possible outcomes of the game. **1**

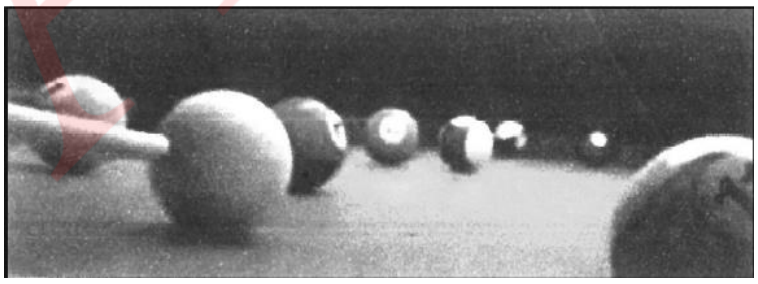
(ii) For each win, a particular gets Rs 10, but if he/she loses, he/she has to pay Rs 5 to the school. If 99 participants played calculate how much fund could the school have collected. **2**

OR

If the same amount of Rs 5 has been decided for winning or losing the game, then how much fund had been collected by school? (Number of participants=99). **2**

(iii) Find the probability of 'Making Purple'. **1**

4. "Eight Ball" is a game played on a pool table with 15 balls numbered 1 to 15 and a "cue ball" that is solid and white. Of the 15 numbered balls, eight are solid (non-white) coloured and numbered 1 to 8 and seven are stripped balls numbered 9 to 15. **[BOARD 2023]**



The 15 numbered pool balls (no cue ball) are placed in a large bowl and mixed, then one ball is drawn out at random.

Based on the above information answer the following questions:

(i) What is the probability that the drawn ball bears number 8? **1**

(ii) What is the probability that the drawn ball bears an even number? **2**

OR

What is the probability that the drawn ball bears a number, which is a multiple of 3? **2**

(iii) What is the probability that the drawn ball is a solid coloured and bears an even number? **1**